

WARNING!!

EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1993 OSWER Directive 9320.1-11.

SITE LOCATION

Site Name: Covitch Property/Former ATF Davidson Co.

Street Address: Main Street

City: Northbridge

State:
MA

Zip Code:
01588

Telephone:
(508) 234-6301

CERCLIS ID No.: MAD046128559

Coordinates: Latitude: 42° 05' 34.5" N
Longitude: 71° 40' 34" W

OWNER/OPERATOR IDENTIFICATION

Owner: Whitinsville Redevelopment Trust
and Arcade Realty Trust

Operator: Whitinsville Redevelopment
Trust and Arcade Realty Trust

Owner Address: 1 Main Street

Operator Address: 1 Main Street

City: Northbridge

City: Northbridge

State:
MA

Zip Code:
01588

Telephone:
(508) 234-6301

State:
MA

Zip Code:
01588

Telephone:
(508) 234-6301

SITE EVALUATION

Agency/Organization: WESTON/START

TDD No.: 95-07-0065

Investigator: Michael G. Jennings

Date: 6 March 1997

EPA CONTACT

EPA SAM: Nancy Smith

Address: JFK Federal Building

City: Boston

State: MA

Zip Code: 02203

Telephone: (617) 573-9697

EPA Reviewer:

Date:



GENERAL INFORMATION

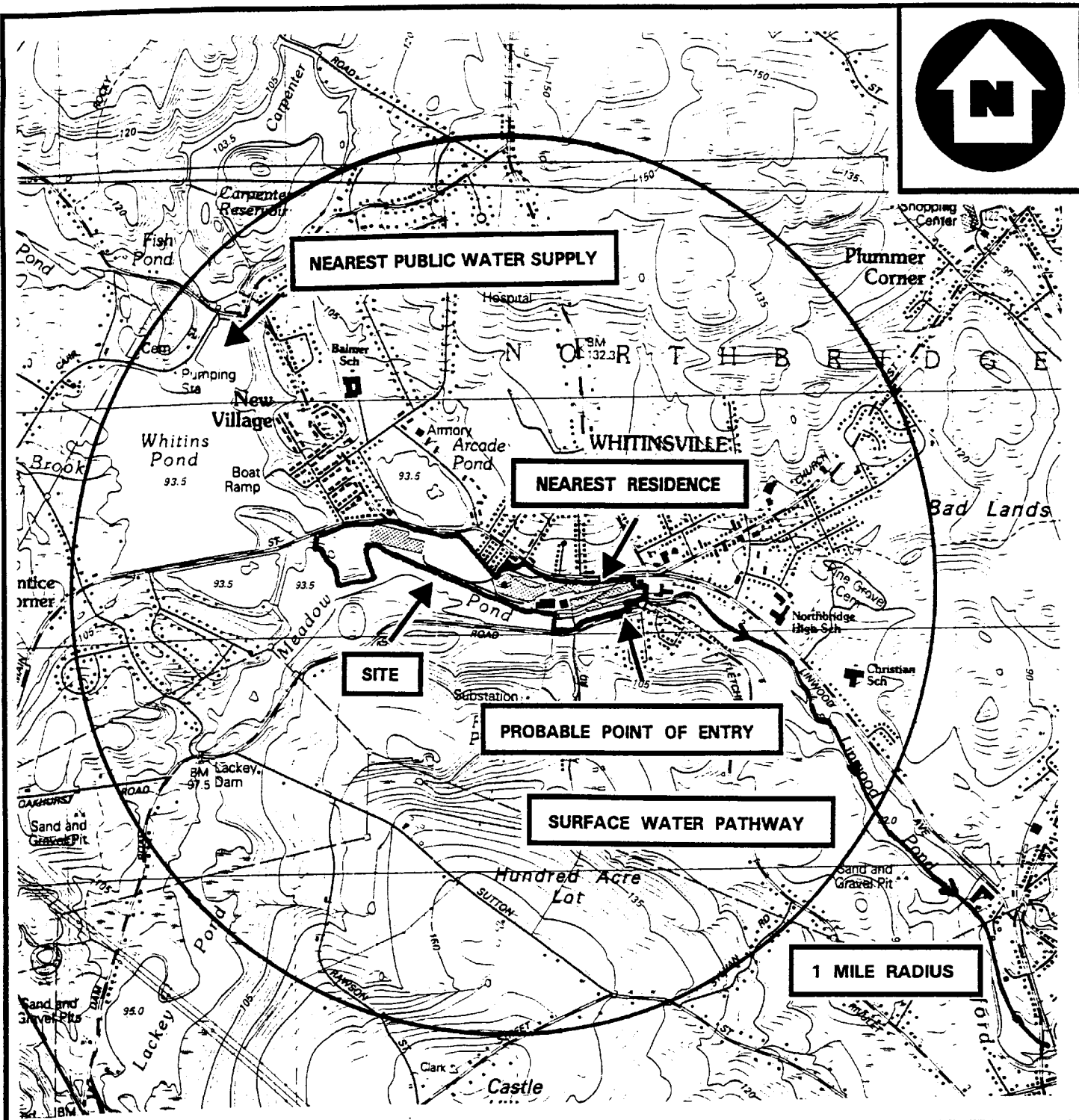
Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references.

The Covitch Property/Former ATF Davidson Co. property (the property) consists of approximately 65 acres of land on numerous parcels in Northbridge, Worcester County, Massachusetts at the following coordinates (measured from the center of the property): 42° 05' 34.5" north latitude and 71° 40' 34" west longitude (Figure 1). Parcels associated with the property are located on both the north and south side of the Mumford River, which bisects the property (Figure 2). The exact chronology of ownership is difficult to determine; however, the following is known. The property was originally developed in the late-1800s as a foundry and metal fabrication mill by Whitin Machine Works (Whitin). Whitin operated on the property for a number of years. At some point Whitin ceased operations on the property and White Consolidated Industries (WCI) commenced on-site operations. A second company, ATF Davidson, Co., a subsidiary of WCI, also operated on the property in the same time frame. WCI and ATF Davidson, Co. ceased operations on the property sometime in the late-1970s or early-1980s. The property is presently owned by the Whitinsville Redevelopment Trust (WRT) and the Arcade Realty Trust (ART). The property is currently operated as leased manufacturing and commercial warehouse space to approximately 30 companies.

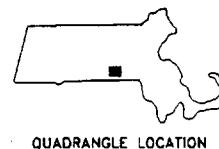
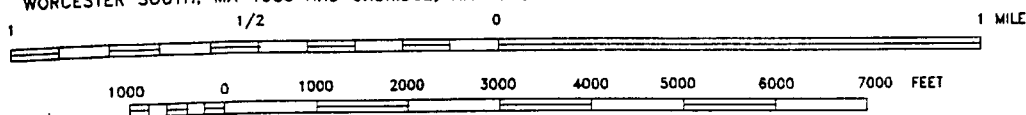
For this evaluation, the eastern developed portion of the property, on the north side of the Mumford River, will be referred to as the Covitch property (Figure 3). The remaining portion of the property on the north side of the Mumford River will be referred to as the Arcade property (Figure 4). There are also two parcels of land on the south side of the Mumford River, a small partially paved employee parking lot and a former coal ash disposal area. For this evaluation, the employee parking lot will be considered as part of the Covitch property, while the former coal ash disposal area will be considered part of the Arcade property. The term *the property* refers to both the Covitch property and the Arcade property as a whole.

As previously mentioned, the property formerly operated as a foundry. Approximately 30 acres of the property, consisting of the entire Arcade property, is land that has been graded and filled with foundry waste. The 1991 Environmental Protection Agency (EPA) Site Inspection (SI) for the property, completed 19 June 1991 by the Massachusetts Department of Environmental Protection (MA DEP), describes the landfilled material as consisting of 90% spent foundry sand, 5% coal ash, and 5% paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. According to the 1991 EPA SI, the filled area has a surficial extent of approximately 730,000 square feet, containing approximately 40,000 cubic yards of material.

The Mumford River flows through the property in an easterly direction. With the exception of the employee parking lot and the former coal ash disposal area, the Mumford River forms the southern boundary of the property. The property is perched approximately 5 feet above the river. A large dam on the Mumford River, connecting the main portion of the property to the employee parking lot, was formerly used to power the on-site manufacturing operations and later to generate hydroelectricity.



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' U.S.G.S. QUADRANGLE(S):
 WORCESTER SOUTH, MA 1983 AND UXBRIDGE, MA 1982



SITE LOCATION MAP
 COVITCH PROPERTY
 FORMER ATF DAVIDSON CO.
 MAIN STREET
 NORTHBRIDGE, MASSACHUSETTS

WESTON®
 MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

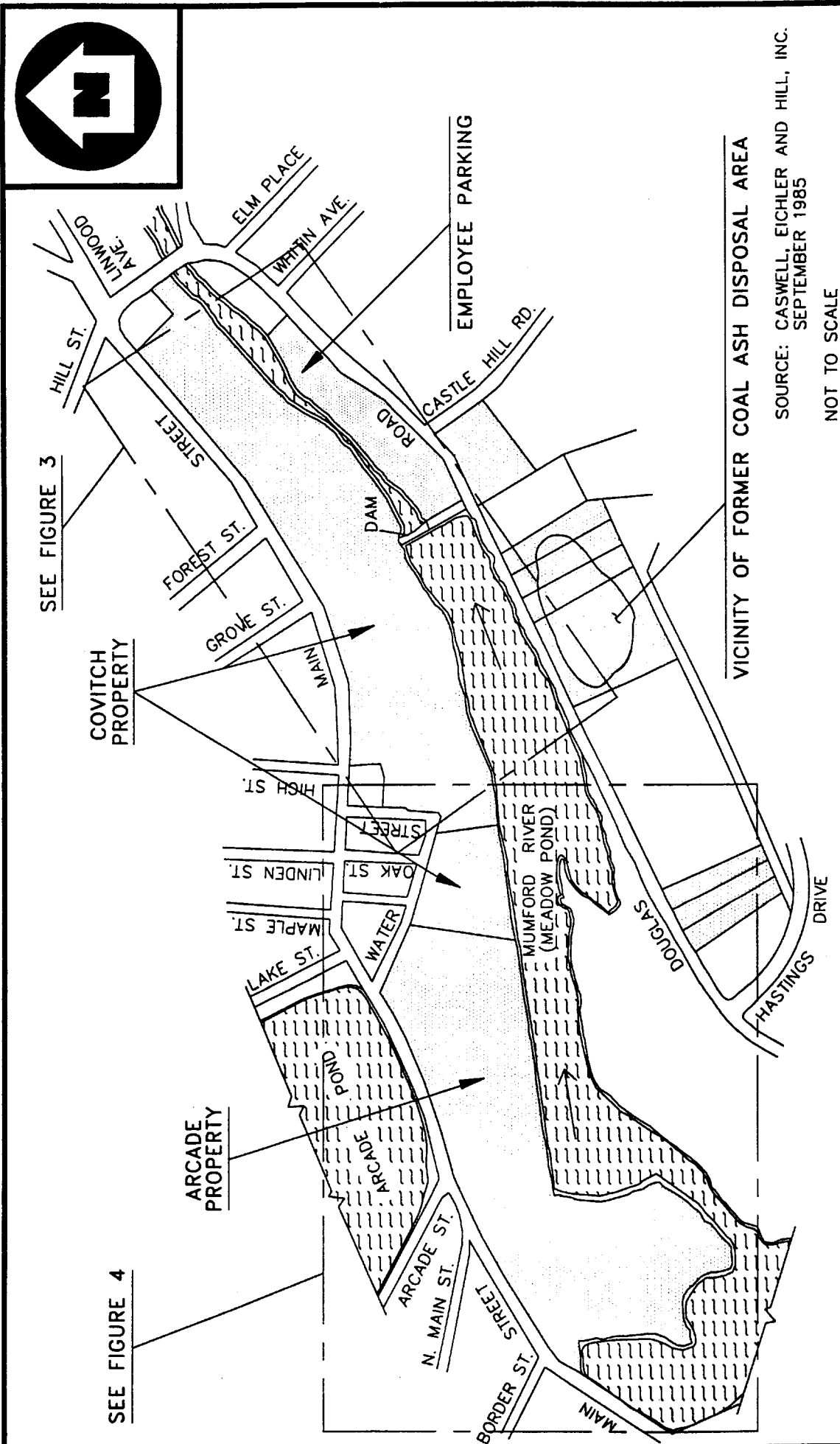
TDD #
 95-07-0065

DRAWN BY:
 M. JENNINGS





DATE
 2/96

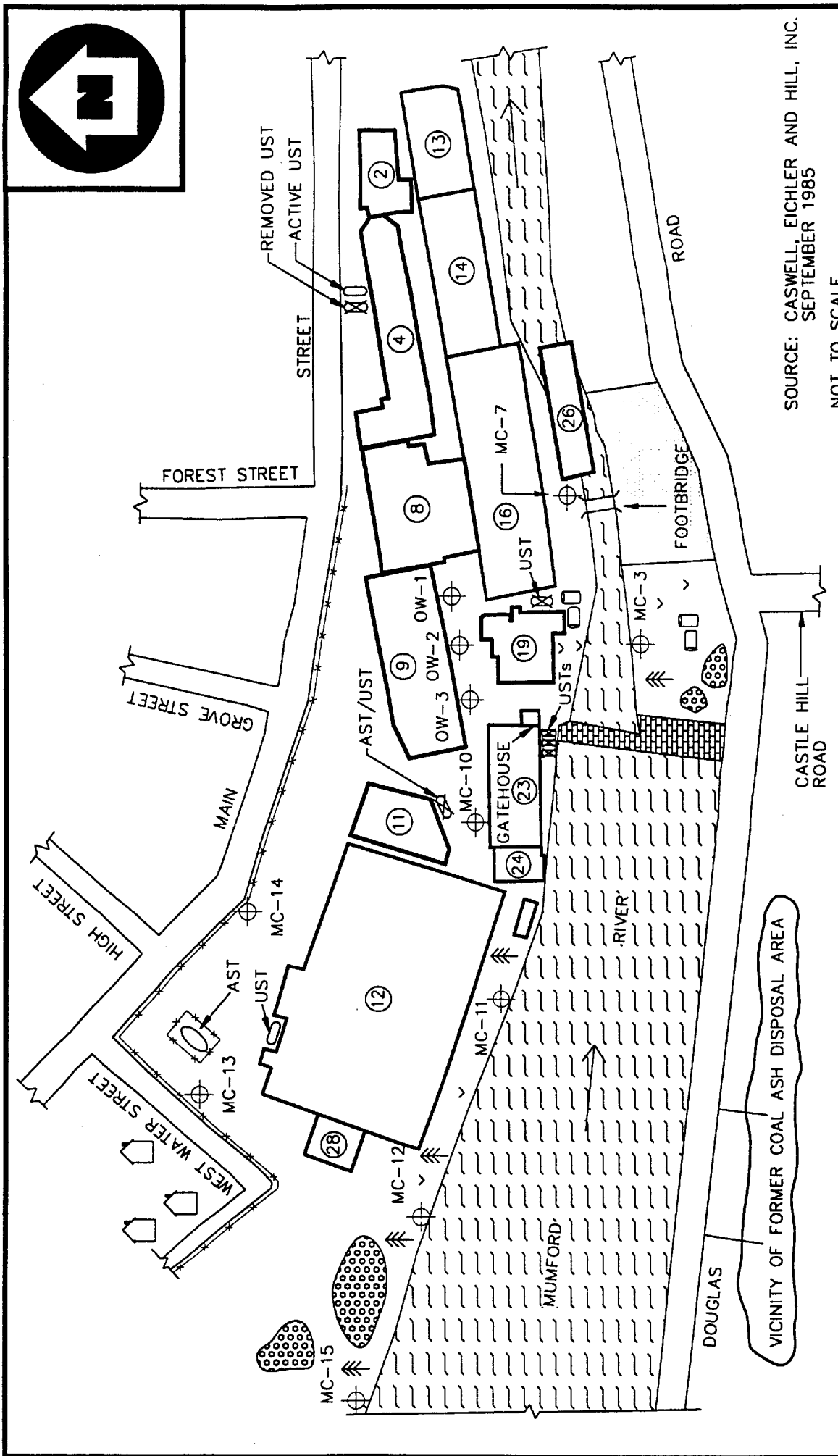
FILE NAME:
 S:\95070065\FIG1

FIGURE 1



SOURCE: CASWELL, EICHLER AND HILL, INC.
SEPTEMBER 1985
NOT TO SCALE

 <p>MANAGERS DESIGNERS/CONSULTANTS</p>		<p>REGION 1 SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM</p>	
		<p>TDD # 95-07-0065</p>	<p>DRAWN BY: W. SHAW</p>
<p>DATE 6/7/96</p>		<p>FILE NAME: S:\95070065\FIG2.DWG</p>	
<p>SEE FIGURE 3</p>		<p>SEE FIGURE 4</p>	
<p>LEGEND</p> <ul style="list-style-type: none">  SURFACE WATER  SITE PROPERTY  FLOW DIRECTION 		<p>SITE MAP</p> <p>COVITCH PROPERTY/ FORMER ATF DAVIDSON CO. MAIN STREET NORTHBRIDGE MASSACHUSETTS</p>	



SOURCE: CASWELL, EICHLER AND HILL, INC.
 SEPTEMBER 1985
 NOT TO SCALE

LEGEND

- FLOW DIRECTION
- [Pattern] DEBRIS PILE
- [Pattern] LARGE DAM
- [Pattern] PAVED PARKING
- [Pattern] SURFACE WATER
- [Symbol] 55-GALLON DRUMS
- [Symbol] FENCE
- [Symbol] RESIDENCE
- [Symbol] BUILDING NUMBER
- [Symbol] TREE
- [Symbol] GRASS
- [Symbol] MONITORING WELL (SCREENED IN OVERBURDEN)

COVITCH PROPERTY SITE MAP

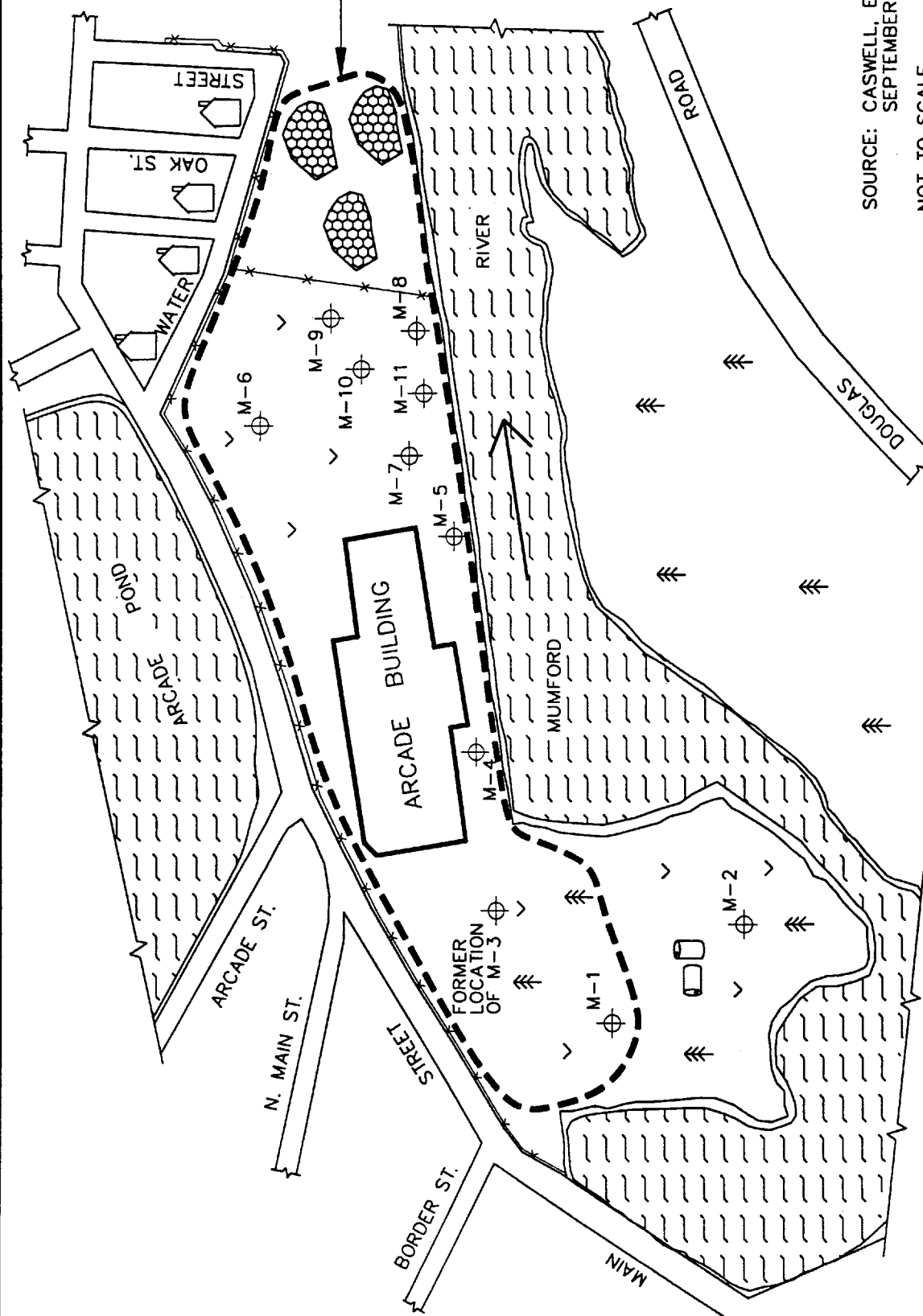
COVITCH PROPERTY/
 FORMER ATF DAVIDSON CO.
 MAIN STREET
 NORTHBRIDGE MASSACHUSETTS

WESTON
 MANAGERS DESIGNERS/CONSULTANTS
 REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TOD # 95-07-0065
 DRAWN BY: M. JENNINGS
 DATE 7/96

FILE NAME: S:\95070065\FIG2B.DWG

FIGURE 3



SOURCE: CASWELL, EICHLER AND HILL, INC.
SEPTEMBER 1985

NOT TO SCALE

WESTON[®]
MANAGERS
DESIGNERS/CONSULTANTS

REGION 1 SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD # 95-07-0065
DRAWN BY: M. JENNINGS
DATE 6/7/96

FILE NAME: S:\95070065\FIG2A.DWG

FIGURE 4

ARCADE PROPERTY SITE MAP

COVITCH PROPERTY /

FORMER ATF DAVIDSON CO.

MAIN STREET

NORTHBRIDGE MASSACHUSETTS

GENERAL INFORMATION (Continued)

The dam creates an impoundment reservoir which stretches to the western extent of the property and beyond. This portion of the Mumford River is commonly referred to as Meadow Pond. A man-made "Raceway" and a series of locks and gates, which were formerly utilized to divert water from the impoundment reservoir in order to directly power the manufacturing equipment, runs beneath the property and several of the on-site buildings. When the power generation system was in use, the diverted water would be returned to the Mumford River below the dam. The dam, Raceway, locks, and gates still exist on the property; although the locks and gates are currently closed isolating the Raceway from the Mumford River.

On 24 April 1985, an oil sheen was observed on the surface water in the Raceway by an unnamed party. The Massachusetts Department of Environmental Quality Engineering (MA DEQE) conducted an investigation of an oil release. On 30 April 1985 the MA DEQE issued a Written Notice of Responsibility (WNOR) to ATF Davidson Co. The WNOR stated that "there is/has been a release/threat of release of oil/hazardous materials including waste oil and mercury at the former ATF Davidson Co. facility, Main Street, Northbridge, Massachusetts." No further reference to mercury contamination could be found by START personnel.

WCI and ATF Davidson Co. retained Caswell, Eichler, and Hill, Inc. (CEH) to conduct an auger probe investigation of the oil release. In a letter report dated 30 May 1985, CEH reported that in the area between Building No. 9 and the Raceway the soil was saturated with oil, both above and below the water table.

As a result of the findings contained within the 30 May 1985 letter report, MA DEQE requested that a hydrogeological investigation of the property be conducted, due to the presence of oil contamination on the property. CEH conducted the investigation in two parts, with the Covitch property and Arcade property investigated separately.

The Covitch property hydrogeological investigation, which included the proposed installation of 15 groundwater monitoring wells, was completed first. Of the 15 proposed wells, five were unable to be completed, primarily due to drill refusal above the water table. The 10 overburden groundwater monitoring wells which were completed are referred to by the "MC" designation on Figure 3 and throughout this report. Two of the monitoring wells (MC-1 and MC-2) were installed on the former coal ash disposal area. Due to the fact that the exact location of MC-1 and MC-2 could not be determined by START personnel, these wells are not located on Figure 3.

Groundwater samples were collected from the 10 completed wells by Environmental Field Services (EFS), a CEH subcontractor, on 30 July 1985. The samples were analyzed by Resource Analysts Inc. (RAI) for volatile organic compounds (VOCs) (EPA Method 624), priority pollutant metals, barium, and total cyanide. Two well samples (MC-7 and MC-14) were also analyzed for oil, grease, and phenols.

CEH stated in a September 1985 report for the Covitch property investigation that no problem levels of VOCs, priority pollutant metals, cyanide, barium, or phenol were detected in the groundwater samples. The analysis indicated that groundwater collected from MC-14 contained

GENERAL INFORMATION (Continued)

24 milligrams per liter (mg/L) of oil and grease. Monitoring well MC-14 is located along the northern extent of the property which adjoins Main Street. MC-14 is upgradient of the area of oil contamination located in the vicinity of the Raceway. START personnel chose the groundwater sample collected from monitoring well MC-7 as the reference sample for the oil and grease analysis due to the fact that it was the only other sample to receive the analysis. The oil and grease concentration in the MC-7 sample was less than 2 mg/L.

CEH addressed possible sources of oil contamination near the Raceway in the September 1985 investigation report. According to the CEH report there have been documented oil releases on both the north and south side of the Raceway. The northern release, occurring over a period of years, was a result of the temporary outdoor storage of metal turnings in the vicinity of Building No. 9 prior to their off-site disposal. The southern release occurred in the basement of the powerhouse, Building No. 19. No further information regarding the oil releases was given in the CEH report.

On 9 December 1985, New England Pollution Control Corporation, Inc. (NEPCCO) was contracted by WCI to install a cut-off trench/well system with a double pump recovery unit in order to remediate the groundwater contamination problem in the vicinity of Building No. 9, the Raceway, and the Mumford River. The system was installed between 23 December 1985 and 20 June 1986.

Three overburden observation wells (OW-1 through OW-3) were also installed as part of the remediation system. The only analytical data that START personnel were able to locate, relative to the collection of groundwater samples from the observation wells, is contained within the Project Summary Report prepared by NEPCCO. A data table contained within the report indicates that groundwater samples were collected from the wells on 17 February 1987 and analyzed by an unknown laboratory for VOCs by EPA Methods 601 and 602. According to the data table, seven VOCs were detected in one or more of the observation wells at concentrations greater than the reference concentration. Detected concentrations ranged from 3 to 57 parts per billion (ppb). START personnel chose the groundwater sample collected from observation well OW-2 as the background location due to its minimal contamination.

The project report indicated that the recovery system was operational from 13 June 1986 until approximately 11 February 1987. According to the 1991 EPA SI report, the recovery and treatment system was shut down in the spring of 1987 at the request of NEPCCO due to decreased levels of VOCs detected in the influent groundwater samples collected from the recovery system. START personnel did not find any information indicating that the treated effluent ever exceeded discharge permit standards.

The Arcade property hydrogeological investigation was conducted by CEH during summer 1985. On 18 July 1985, EFS collected groundwater samples from the eight groundwater monitoring wells (M-1 through M-8) installed on the Arcade property (Figure 4). These samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium, and total cyanide. The results of the investigation, as stated in the 1985 Arcade property investigation report, entitled *Monitoring Well Installation and Ground Water and River Bottom Sediment*

GENERAL INFORMATION (Continued)

Quality Analyses, ATF Davidson Company Arcade Facility (October 1985 CEH report), indicated that the groundwater below the Arcade property contained detectable levels of four VOCs. Vinyl chloride, trans-1,2-dichloroethene, trichloroethene, and tetrachloroethene were detected in one or more of the monitoring well samples at concentrations greater than the reference concentrations. Detected concentrations ranged from 10 ppb for trichloroethene (M-3) to 950 ppb for tetrachloroethene (M-6). Barium was also detected in several groundwater samples at concentrations three times greater than the barium concentration of the reference sample (M-1). Barium was present at the highest concentration (2,900 ppb) in the sample from monitoring well M-5. START personnel chose the groundwater sample collected from monitoring well M-1 as the background location due to its crossgradient location and uncontaminated condition.

As a result of the detection of VOCs in the groundwater below the Arcade property, an additional round of groundwater samples were collected on 13 November 1985 and sent to RAI for VOC analysis by EPA Method 624. The results of the analysis were documented in a CEH report entitled *Additional Investigations ATF/Davidson Arcade Facility, Covitch Properties, Mumford River* (January 1986 CEH report). The January 1986 CEH report indicated that some of the VOCs previously detected in several of the monitoring wells were not detected in the 13 November 1985 samples collected from the same wells. However, the January 1986 CEH report further indicated that the concentration of vinyl chloride and trans-1,2-dichloroethene detected in monitoring well M-8 were increasing. The concentrations detected in the 13 November 1985 groundwater samples collected from monitoring well M-8 ranged from 380 ppb for vinyl chloride to 1,100 ppb for trans-1,2-dichloroethene. No VOCs were detected in the background sample (M-1) collected with the November 1985 groundwater samples.

A third round of groundwater samples was collected by CEH from the Arcade property on 24 January 1987, as part of an additional investigation of the area around monitoring well M-8. This investigation included the installation and sampling of three additional overburden groundwater monitoring wells (M-9 through M-11). The new wells were located radially in the vicinity of monitoring well M-8. The groundwater samples collected on 24 January 1987 were submitted to RAI for VOC analysis by EPA Method 624. Results of the analysis of the 24 January 1987 groundwater samples were documented in a report CEH report entitled *Additional M-8 Investigations, ATF Davidson Arcade Facility* (March 1987 CEH report).

The March 1987 CEH report stated that only one of the newly installed wells (M-9) contained VOC contamination. Tetrachloroethene was detected in this monitoring well at a concentration greater than the reference concentration. START personnel chose the groundwater sample collected from monitoring well M-10 as the background location due to its upgradient location and its uncontaminated condition. Tetrachloroethene was detected in monitoring well M-9 at a concentration of 48 ppb. This compound had previously only been detected in monitoring well M-6.

The March 1987 CEH report also stated that the concentrations of vinyl chloride (280 ppb) and trans-1,2-dichloroethene (640 ppb) detected in monitoring well M-8 were decreasing. However, trichloroethene was detected at 17 ppb in the March 1987 groundwater samples collected from monitoring well M-8. This compound had not been detected in monitoring well M-8 groundwater samples prior to January 1987.

GENERAL INFORMATION (Continued)

In July 1987 CEH submitted a risk assessment report entitled *Risk Assessment of Area Surrounding M-8 at the ATF/Davidson Arcade Facility* (July 1987 CEH report). The July 1987 CEH report stated that the VOC-contaminated plume in the vicinity of monitoring well M-8 covered approximately 13,100 square feet. In the July 1987 CEH report, CEH theorized that the plume consisted predominantly of a parent compound (trichloroethene) and two weathered species (vinyl chloride and trans-1,2-dichloroethene). The report further stated that the mass balance of chemical compounds present in monitoring well M-8 shifted towards the weathered species. CEH attributed this to a long period of emplacement or an accelerated weathering process. According to the July 1987 CEH report, the chemical contamination detected in the Arcade property groundwater samples was migrating towards the Mumford River where the contamination would ultimately be diluted, diminishing its impact on human health and the environment.

In June 1991, MA DEP completed an SI on the property for EPA. No environmental samples were collected.

On 2 May 1996 Roy F. Weston, Inc. (WESTON®) Superfund Technical Assessment and Response Team (START) personnel conducted an on-site reconnaissance of the property. It was observed, at the time of the reconnaissance, that there was a general lack of vegetation on the Covitch property due to extensive development, with the exception being a small strip of land bordering the northern bank of the Mumford River. Grass, shrubs, and some small trees were found in this area. The Arcade property also contained a general lack of vegetation at the time of the reconnaissance. The surficial soils of the foundry sand landfill tended to support sporadic grasses and some small trees and shrubs. A former island, which is now connected via landfilled material to the northern shore of the Mumford River at the western extent of the Arcade property, showed thick vegetation; consisting of large trees and shrubs. This condition can be considered typical of the native vegetation of the area.

During the on-site reconnaissance, START personnel attempted to locate the former coal ash disposal area. According to historical information, the former coal ash disposal area is located south of Douglas Road and west of Castle Hill Road. An area of landfilled material was observed in the general vicinity of the historical location of the former coal ash disposal area. The landfilled material consisted of a black uniform grained, non-native material with a surficial extent of approximately 7,500 square feet. However, START personnel were unable to locate monitoring wells MC-1 and MC-2, installed on the former coal ash disposal area in conjunction with the September 1985 CEH report. Locating the two monitoring wells would have verified that the area in question was the former coal ash disposal area.

START personnel noted several piles of debris on both the Covitch property and Arcade property during the on-site reconnaissance. On the Covitch property several piles of concrete, brick, metal, and wood debris, associated with the on-going renovation of the property were observed south of the Mumford River. The total surficial extent of these piles was approximately 300 square feet.

GENERAL INFORMATION (Continued)

On the Arcade property several piles of scrap metal were observed on the foundry sand landfill. These piles were also associated with the on-going renovation of the property. Several electric motors and an above-ground storage tank (AST) were strewn in among the debris. The tank volume appeared to be approximately 300 gallons. The total surficial extent of the debris piles was approximately 30,000 square feet. The surficial soils of the foundry sand landfill in the vicinity of the metal debris piles appeared stained with an oily-type material. This stained area will be evaluated as a component of the landfill.

During the on-site reconnaissance, START personnel observed an additional AST in the northwest corner of the Covitch property. The volume of the AST was 275 gallons, according to representatives of WRT. The AST is used to store diesel fuel for vehicles utilized on the property. The AST was situated on a concrete pad. Access to the AST was restricted by a 6-foot chain-link fence.

During the on-site reconnaissance, START personnel observed several 55-gallon drums in various conditions, throughout the property. Outside, six 55-gallon metal drums and one 55-gallon plastic drum were observed. Of these seven drums, one crushed and rusted metal drum was observed under a metal walkway in the vicinity of the former powerplant, two empty and rusted metal drums were observed on the western extent of the property, and three empty metal and one empty plastic 55-gallon drums were observed on the unpaved portion of the employee parking lot located on the south side of the Mumford River.

START personnel observed several large pipes (plastic, metal, and reinforced concrete) protruding from the northern shoreline of the Mumford River, where the shoreline borders the property. The large pipes were noted above and below the water surface. The 1991 EPA SI report for the property stated that untreated electroplating wastewater had been discharged to the Mumford River from the property between 1930 to 1965. According to the EPA SI report, an on-site wastewater treatment plant was installed on the property in 1965 and treated wastewater was discharged to the Mumford River from 1965 until September 1982. Between 1974 and 1982 discharge of treated wastewater was carried out under a National Pollution Discharge Elimination System (NPDES) permit (No. MA0001252). The 1991 EPA SI report indicated that the wastewater treatment plant ceased operations in September 1982. The SI report did not indicate why operations ceased. The present owners of the property were unable to provide any additional information concerning the discharge of industrial wastewater to the Mumford River. START personnel were unable to find any additional information concerning the discharge of treated or untreated wastewater to the Mumford River.

Inside the mill complex, approximately 70 55-gallon drums were observed in the manufacturing areas of several of the current tenant companies. Labels on the drums indicated that the drums contained both virgin material and waste products associated with the various operations conducted on the premises by each business. Approximately 50 metal drums were observed with labels indicating that they contained "hazardous waste" or "waste oil".

Many of the companies leasing space within the property utilize flammable material in their manufacturing operations. Numerous explosion-proof flammable materials storage cabinets were

GENERAL INFORMATION (Continued)

observed in various buildings throughout the property. Additionally, several spray booths were observed operating in several of the manufacturing areas located throughout the on-site buildings. Several hazardous materials were observed in use during the on-site reconnaissance. These materials consisted of paints, thinners, solvents, inks, wood stains, adhesives, and cutting fluids/coolants.

According to information START personnel received from WRT after the on-site reconnaissance, seven underground storage tanks (USTs) and two additional ASTs exist/existed on the property. Some of the tanks have been removed, some have been filled in place, and some are still in use. A summary of the information concerning the ASTs and USTs is presented in the following Table.

**Summary of Underground and Above-ground Storage Tanks on the
Covitch Property/Former ATF Davidson Co.**

Underground Storage Tanks			
Location	Size (gallons)	Contents	Status
Adjacent to Bldg. 4	500	Fuel Oil	Removed 1985
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 12	20,000	Fuel Oil	Filled 1984
Adjacent to Bldg. 4	5,000	Fuel Oil	Active
Above-ground Storage Tanks			
Location	Size (gallons)	Contents	Status
Adjacent to Bldg. 16	30,000	No. 6 Fuel Oil	Removed 1995
Adjacent to Bldg. 12	275	Diesel Fuel	Active
Adjacent to Bldg. 11	5,000	No. 6 Fuel Oil	Removed 1984

Bldg = Building

The information START personnel received from WRT after the on-site reconnaissance also indicated that eight transformers which contained polychlorinated biphenyls (PCBs) were formerly located on the property. These transformers were verified by Transformer Service, Inc. (TSI) to contain PCBs. A TSI inspection on 15 April 1989 indicated that only one of the transformers was potentially leaking. No further information concerning transformer leakage was available to START personnel. All of the PCB-containing transformers have been removed from the property. A summary of the transformers formerly located on the property is presented below.

GENERAL INFORMATION (Concluded)

Summary of Transformers Formerly Located on the Covitch Property/Former ATF Davidson Co. Property

Location	Capacity (gallons)	Date Removed from Service
Bldg. 9, Floor 2	380	17 December 1993
Bldg. 9, Floor 3	380	6 June 1996
Bldg. 10	445	27 October 1994
Bldg. 12, Floor 1	300	28 June 1995
Bldg. 12, Floor 2	Unknown	Unknown
Bldg. 16	445	6 June 1996
Between Bldg. 16 and Bldg. 4	Unknown	6 June 1996
Bldg. 19	840	27 October 1994

Bldg = Building

SOURCE EVALUATION

Description of each Source: Identify each source area by name and number, and classify each source into a source type category (see SI Table 1). Describe the dimensions of each source. Identify the hazardous substances associated with each source. Determine the containment characteristics for each source by pathway (see HRS Tables 3-2, 4-2, 6-3 and 6-9).

Source No. 1: Foundry Sand Landfill (*Landfill*)

The Arcade property is built on a foundry sand landfill. The 1991 EPA SI report stated that the landfill consists of 40,000 cubic yards of foundry sand (90%), coal ash (5%), and other material consisting of paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. The 1991 EPA SI Report also estimated that the surficial extent of the landfill is approximately 730,000 square feet. There is no containment associated with this source. The source is available to all pathways.

Source No. 2: VOC Plume-Arcade Property (*Contaminated Soil*)

A VOC plume exists/existed within the foundry sand landfill. A risk assessment on the plume was conducted by CEH in 1987. As part of the risk assessment, it was determined by CEH that the plume occupied approximately 13,100 square feet. There is no containment associated with this source. The source is available to all pathways.

Source No. 3: Oil/VOC Plume-Covitch Property (*Contaminated Soil*)

There is/was an area of contaminated soil and groundwater in the vicinity of the Raceway on the Covitch property. A groundwater remediation system was installed in late 1985/early 1986 to address VOC contamination detected in this area. The specific dimensions for the extent of contamination in this area were unable to be determined; therefore, this source will be listed but not evaluated. There is no containment associated with this source. The source is available to all pathways.

Source No. 4: Coal Ash Disposal Area (*Landfill*)

An area of landfilled material exists, south of Douglas Road, on land owned by WRT. This land corresponds to property formerly owned by Whitin and WCI where coal ash was reportedly disposed. During the START on-site reconnaissance, a surface area of approximately 7,500 square feet of landfilled material was observed. START personnel were unable to locate monitoring wells MC-1 and MC-2, which would have verified that the area in question was the actual location of the former coal ash landfill. There is no containment associated with this source. The source is available to all pathways.

Source No. 5: 55-gallon Drums-Exterior (*Drums*)

Six metal 55-gallon drums and one plastic 55-gallon drum was observed on the exterior portion of the property during the START on-site reconnaissance. All of the drums appeared to be empty. These drums are considered a source due to their unknown contents. There was no containment associated with this source and the source was available to all pathways.

Source No. 6: 55-gallon Drums-Interior (*Drums*)

Approximately 70 metal drums were observed throughout the on-site buildings during the START on-site reconnaissance. Many of the drums appeared to contain virgin material and as

SOURCE EVALUATION (Continued)

such would not be considered for this evaluation. However, approximately 50 drums were observed to be labeled as "hazardous waste" and "waste oil". These drums were located in the various metal processing businesses which lease space on the Covitch property. There is no containment associated with the drums and the source is available to all pathways.

Source No. 7: Debris Piles-Arcade Property (Piles)

On the Arcade property several piles of scrap metal were observed on the foundry sand landfill. These piles were associated with the on-going renovation of the property. Several electric motors were strewn in among the debris. The total surficial extent of the debris piles was approximately 30,000 square feet. There is no containment associated with this source. The source is available to all pathways.

Source No. 8: Debris Piles-Covitch Property (Piles)

On the Covitch property several piles of concrete, brick, metal, and wood debris, associated with the on-going renovation of the property were observed south of the Mumford River. The total surficial extent of these piles was approximately 300 square feet. There is no containment associated with this source. The source is available to all pathways.

Source No. 9: ASTs and USTs (Tanks)

Historically, there have been at least six USTs and three ASTs utilized on the property. At the time of this evaluation, one UST and one AST were still in use. All of the tanks have been used to store petroleum products. There is no containment associated with this source. The source is available to all pathways. However due to the Comprehensive Environmental Response, Compensation, and Liability Act's (CERCLAs) Petroleum Exclusion Policy, this source will be listed but not evaluated.

Source No. 10: Transformers (Non-Drum Containers)

Historically, there have been at least eight transformers known to contain PCB-contaminated oil utilized on the property. These transformers had a total storage capacity of approximately 3,000 gallons. The PCB-containing transformers were removed from the property after the completion of the 1991 EPA SI report. There is no containment associated with these sources. These sources are available to all pathways

Source No.	Source Type	Pathway Availability			
		GW	SW	SE	A
1	Landfill	Y	Y	Y	Y
2	Contaminated Soil	Y	Y	Y	Y
3	Contaminated Soil	Y	Y	Y	Y
4	Landfill	Y	Y	Y	Y
5	Drums	Y	Y	Y	Y
6	Drums	Y	Y	Y	Y

SOURCE EVALUATION (Continued)

Source No.	Source Type	Pathway Availability			
		GW	SW	SE	A
7	Piles	Y	Y	Y	Y
8	Piles	Y	Y	Y	Y
9	Tanks	I	I	I	I
10	Non-Drum Containers	Y	Y	Y	Y

Legend: Y = available to pathway
 N = not available to pathway
 ? = availability unknown
 I = ineligible waste

SOURCE EVALUATION (Continued)

Hazardous Waste Quantity (HWQ) Calculations: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

For each source, provide HWQ calculations by tier and provide assumptions. Note: HWQ calculations may be different for the soil exposure pathway.

This is a multiple source site. Due to insufficient data, Tier A (Hazardous Constituent Quality) and B (Hazardous Wastestream Quality) could not be evaluated.

Source No. 1: Landfill

Tier C: The 1991 EPA SI Report states that the landfill is approximately 40,000 cubic yards.
 $40,000 \div 2,500 = 16.0$

Tier D: The 1991 EPA SI Report states that the surficial extent of the landfill is approximately 730,000 square feet.

$$730,000 \div 3,400 = 214.71$$

$$\text{WQ} = 214.71$$

Source No. 2: Contaminated Soil

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: The July 1987 CEH report states that the VOC plume comprises approximately 13,100 square feet.

$$13,100 \div 34,000 = 0.39$$

$$\text{WQ} = 0.39$$

Source No. 3: Not evaluated.

Source No. 4: Landfill.

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: During the START on-site reconnaissance, an area of approximately 7,500 square feet of landfilled material was observed.

$$7,500 \div 3,400 = 2.21$$

$$\text{WQ} = 2.21$$

Source No. 5: Drums.

Tier C: During the START on-site reconnaissance, seven 55-gallon drums were observed on the exterior portion of the property.

$$7 \div 10 = 0.7$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 0.7$$

Source No. 6: Drums.

Tier C: During the START on-site reconnaissance, approximately 50 55-gallon drums, labeled as containing waste material, were observed on the interior portion of the property.

$$50 \div 10 = 5.0$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 5$$

SOURCE EVALUATION (Concluded)

Source No. 7: Piles

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: According to on-site observations made during the START reconnaissance, the total surficial extent of the piles is approximately 30,000 square feet.

$$30,000 \div 13 = 2,307.69$$

$$\text{WQ} = 2,307.69$$

Source No. 8: Piles

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: According to on-site observations made during the START reconnaissance, the total surficial extent of the piles is approximately 300 square feet.

$$300 \div 13 = 23.08$$

$$\text{WQ} = 23.08$$

Source No. 10: Non-Drum Container

Tier C: The total storage capacity of the eight transformers was approximately 3,000 gallons of PCB-contaminated oil.

$$3,000 \div 500 = 6$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 6$$

All of the sources evaluated are available to all pathways. The multiple source site Hazardous Waste quantity value is calculated as follows:

$$214.71 + 0.39 + 2.21 + 0.70 + 5 + 2,307.69 + 23.08 + 6 = 2,559.78$$

$$100 < 2,559.78 < 10,000$$

$$\text{HWQ} = 100$$

$$\text{GW HWQ} = 100$$

$$\text{SW HWQ} = 100$$

$$\text{SE HWQ} = 100$$

$$\text{AIR HWQ} = 100$$

SI TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

Tier	Source Type	Single Source Sites (assigned HWQ scores)				Multiple Source Sites
		HWQ = 10	HWQ = 100	HWQ = 10,000	HWQ = 1,000,000	Divisors for Assigning Source WQ Values
A Hazardous Constituent Quantity	N/A	HWQ = 1 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	> 100 to 10,000 lbs	> 10,000 to 1 million lbs	> 1 million lbs	lbs ÷ 1
B Hazardous Wastestream Quantity	N/A	≤ 500,000 lbs	> 500,000 to 50 million lbs	> 50 million to 5 billion lbs	> 5 billion lbs	lbs ÷ 5,000
C Volume	Landfill	≤ 6.75 million ft ³ ≤ 250,000 yd ³	> 6.75 million to 675 million ft ³ > 250,000 to 25 million yd ³	> 675 million to 67.5 billion ft ³ > 25 million to 2.5 billion yd ³	> 67.5 billion ft ³ > 2.5 billion yd ³	ft ³ ÷ 67,500 yd ³ ÷ 2,500
	Surface impoundment	≤ 6,750 ft ³ ≤ 250 yd ³	> 6,750 to 675,000 ft ³ > 250 to 25,000 yd ³	> 675,000 to 67.5 million ft ³ > 25,000 to 2.5 million yd ³	> 67.5 million ft ³ > 2.5 million yd ³	ft ³ ÷ 67.5 yd ³ ÷ 2.5
	Drums	≤ 1,000 drums	> 1,000 to 100,000 drums	> 100,000 to 10 million drums	> 10 million drums	drums ÷ 10
	Tanks and non-drum containers	≤ 50,000 gallons	> 50,000 to 5 million gallons	> 5 million to 500 million gallons	> 500 million gals.	gallons ÷ 500
	Contaminated soil	≤ 6.75 million ft ³ ≤ 250,000 yd ³	> 6.75 million to 675 million ft ³ > 250,000 to 25 million yd ³	> 675 million to 67.5 billion ft ³ > 25 million to 2.5 billion yd ³	> 67.5 billion ft ³ > 2.5 billion yd ³	ft ³ ÷ 67,500 yd ³ ÷ 2,500
	Pile	≤ 6,750 ft ³ ≤ 250 yd ³	> 6,750 to 675,000 ft ³ > 250 to 25,000 yd ³	> 675,000 to 67.5 million ft ³ > 25,000 to 2.5 million yd ³	> 67.5 million ft ³ > 2.5 million yd ³	ft ³ ÷ 67.5 yd ³ ÷ 2.5
	Other	≤ 6,750 ft ³ ≤ 250 yd ³	> 6,750 to 675,000 ft ³ > 250 to 25,000 yd ³	> 675,000 to 67.5 million ft ³ > 25,000 to 2.5 million yd ³	> 67.5 million ft ³ > 2.5 million yd ³	ft ³ ÷ 67.5 yd ³ ÷ 2.5

SI TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

Tier	Source Type	Single Source Sites (assigned HWQ scores)				Multiple Source Sites
		HWQ = 10	HWQ = 100	HWQ = 10,000	HWQ = 1,000,000	Divisors for Assigning Source WQ Values
D Area	Landfill	≤340,000 ft ² ≤7.8 acres	>340,000 to 34 million ft ² >7.8 to 780 acres	>34 million to 3.4 bil. ft ² >780 to 78,000 acres	>3.4 billion ft ² >78,000 acres	ft ² ÷ 3,400 acres ÷ 0.078
	Surface Impoundment	≤1,300 ft ² ≤0.029 acres	>1,300 to 130,000 ft ² >0.029 to 2.9 acres	>130,000 to 13 million ft ² >2.9 to 290 acres	>13 million ft ² >290 acres	ft ² ÷ 13 acres ÷ 0.00029
	Contaminated Soil	≤3.4 million ft ² ≤78 acres	>3.4 million to 340 million ft ² >78 to 7,800 acres	>340 million to 34 bil. ft ² >7,800 to 780,000 acres	>34 billion ft ² >780,000 acres	ft ² ÷ 34,000 acres ÷ 0.78
	Pile	≤1,300 ft ² ≤0.029 acres	>1,300 to 130,000 ft ² >0.029 to 2.9 acres	>130,000 to 13 million ft ² >2.9 to 290 acres	>13 million ft ² >290 acres	ft ² ÷ 13 acres ÷ 0.00029
	Land treatment	≤27,000 ft ² ≤0.62 acres	>27,000 to 2.7 million ft ² >0.62 to 62 acres	>2.7 mil. to 270 million ft ² >62 to 6,200 acres	>270 million ft ² >6,200 acres	ft ² ÷ 270 acres ÷ 0.0062

1 ton = 2,000 lbs = 1 yd³ = 4 drums = 200 gallons

SI TABLE 2: HWQ SCORES FOR MULTIPLE SOURCE SITES

Site WQ Total	HWQ Score
0	0
1 ^a to 100	1 ^b
>100 to 10,000	100
>10,000 to 1,000,000	10,000
>1,000,000	1,000,000

^aIf the HWQ total is between 0 and 1, round it to 1.

^bIf the hazardous constituent quantity data are not complete, assign the score of 10.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Enter "NA" for substances which are not available to a pathway.
Enter "NL" for substances values not listed in SCDM.
Enter "-" for values not calculated due to substances values not listed in SCDM.
Provide footnote for substances listed in table but not used for scoring purposes
(e.g. BTEX substances attributable to a gasoline tank.)

Sources: *

1. Foundry Sand Landfill (Landfill)

3. Oil/VOC Plume-Covitch Property (Contaminated Soil)

2. VOC Plume-Arcade Property (Contaminated Soil)

Source	Hazardous Substance	Toxicity	GROUNDWATER PATHWAY		SURFACE WATER PATHWAY							
			GW Mobility (HRS Table 3-8)	Tox. x Mobility Value (HRS Table 3-9)	Pers. (HRS Tables 4-10 and 4-11)	Tox. x Pers. Value (HRS Table 4-12)	Bioacc. Pot. (HRS Table 4-15)	OVERLAND/FLOOD MIGRATION				
								Tox. x Pers. x Bioacc. Value (HRS Table 4-16)	Ecotox. (HRS Table 4-19)	Ecotox. x Pers. (HRS Table 4-20)	Eco. Bioacc. Pot. (HRS Table 4-20)	Ecotox. x Pers. x Eco. Bioacc. Value (HRS Table 4-21)
1,2,3	Barium	10,000	0.01	100	1	10,000	0.5	5000	1	1	0.5	0.5
1,2,3	Benzene	100	1	100	0.4	40	5,000	2E+05	100	40	500	20,000
1,2,3	Chloroethane (Ethyl chloride)	1	1	1	0.0007	0.0007	5	0.0035	NL	--	5	--
1,2,3	Dichloroethane, 1,1-	10	1	10	0.4	4	5	20	NL	--	5	--
1,2,3	Dichloroethylene, trans-1,2-	100	1	100	0.4	40	50	2,000	1	0.4	50	20
1,2,3	Tetrachloroethylene	100	1	100	0.4	40	50	2,000	100	40	50	2,000
1,2,3	Toluene	10	1	10	0.4	4	50	200	100	40	50	2,000
1,2,3	Trichloroethane, 1,1,1-	1	1	1	0.4	0.4	5	2	10	4	5	20
1,2,3	Trichloroethylene	10	1	10	0.4	4	50	200	100	40	50	2,000
1,2,3	Vinyl chloride	10,000	1	10,000	0.0007	7	5	35	NL	--	5	--
1,2,3	Xylene, p- (also use for total)	10	1	10	0.4	4	50	200	100	40	50	2,000
1,2,3	Zinc	10	0.01	0.1	1	10	500	5,000	10	10	500	5,000
							BCF					

SCDM Version: JUN96

NOTES:

SI Table 3 assumptions: liquid-phase waste disposed of in non-karst terrane, fresh-water river environment values.

* For this evaluation, chemical contamination will be attributed to Sources 1 through 3 only.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET
(Continued)

Sources:

1. Foundry Sand Landfill (Landfill)
3. Oil/VOC Plume-Covitch Property (Contaminated Soil)

2. VOC Plume-Arcade Property (Contaminated Soil)

Source	Hazardous Substance	Toxicity	SURFACE WATER PATHWAY						
			GROUNDWATER TO SURFACE WATER				AIR PATHWAY		
			Tox. x Mob. x Pers. Value (HRS Table 4-26)	Tox. x Mob. x Pers. x Bioacc. Value (HRS Table 4-28)	Ecotox. x Mob. x Pers. Value (HRS Table 4-29)	Ecotox. x Mob. x Pers. x Ecobioacc. Value (HRS Table 4-29)	Gaseous/ Particulate (HRS Table 6-13) (indicate G or P)	Mobility (HRS Table 6-11,6-12)	Tox. x Mob. Value (HRS Table 6-13)
1,2,3	Barium	10,000	100	50	0.01	0.005	P	8E-05	0.8
1,2,3	Benzene	100	40	2E+05	40	20,000	G	1	100
1,2,3	Chloroethane (Ethyl chloride)	1	0.0007	0.0035	--	--	G	1	1
1,2,3	Dichloroethane, 1,1-	10	4	20	--	--	G	1	10
1,2,3	Dichloroethylene, trans-1,2-	100	40	2,000	0.4	20	G	1	100
1,2,3	Tetrachloroethylene	100	40	2,000	40	2,000	G	1	100
1,2,3	Toluene	10	4	200	40	2,000	G	1	10
1,2,3	Trichloroethane, 1,1,1-	1	0.4	2	4	20	G	1	1
1,2,3	Trichloroethylene	10	4	200	40	2,000	G	1	10
1,2,3	Vinyl chloride	10,000	7	35	--	--	G	1	10,000
1,2,3	Xylene, p- (also use for total)	10	4	200	40	2,000	G	1	10
1,2,3	Zinc	10	0.1	50	0.1	50	P	8E-05	0.0008

GROUNDWATER PATHWAY

Pathway Description and Scoring Notes: Describe the Groundwater Migration Pathway. Include the names and brief descriptions of the aquifers underlying the site, the depth to groundwater, the locations of the nearest private and public drinking water supplies and the aquifers from which they draw, and the population relying upon groundwater drawn from within four miles of the site for their drinking water supplies.

Briefly discuss any sampling events relative to the Groundwater Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Groundwater Pathway for this site, or any key factors which influence your scoring rationale.

Two separate hydrogeological investigations were conducted on the property during the summer of 1985, one on the Covitch property which included the attempted installation of 15 overburden groundwater monitoring wells and a separate investigation of the Arcade property which included the installation of eight overburden groundwater monitoring wells. Both investigations were conducted by CEH.

The Covitch property is almost entirely developed with a large industrial mill complex which dates back to the 1800s. Due to this, overburden encountered on this portion of the property is considered borrow fill. CEH described this material in the 1985 monitoring well installation report for the Covitch property investigation as consisting of brown (grayish below the water table) silty fine to medium sand with occasional coarse gravel, cobbles, and small boulders. CEH further reported that this material closely resembled the native till of the region. Groundwater depths on the Covitch property ranged from 5 to 8 feet below grade. CEH determined that groundwater in this area generally flows south towards the Mumford River. CEH calculated that the groundwater seepage velocity below the Covitch property varied from a minimum of approximately 3.5 feet per year (eastern extent) to a maximum of approximately 52 feet per year (western extent).

Two of the monitoring wells installed as part of the 1985 Covitch property investigation were located in the former coal ash disposal area south of Douglas Road. CEH reported that the overburden encountered during the installation of these monitoring wells was similar to that encountered on the Covitch property. Groundwater was encountered on the former coal ash disposal area property approximately 5 feet below grade. CEH estimated that groundwater below the former coal ash disposal area was flowing north towards the Mumford River. CEH calculated that the groundwater seepage velocity below the former coal ash disposal area was approximately 3.5 feet per year.

To the west of the mill buildings the overburden is comprised of foundry fill. CEH described the foundry fill in the 1985 monitoring well installation report for the Arcade property investigation as consisting of fine to coarse sand and gravel with some pumice like material, foundry bed glass, and ash. The fill material is a result of the large foundry which operated on the property. The spent foundry sand was graded into the river creating a large land mass which stretches approximately 3,200 feet west of the former foundry building. The filled area contains approximately 40,000 cubic yards of material in an area approximately 730,000 square feet. CEH reported that groundwater was encountered on the Arcade property at depths varying between 3 and 7 feet below grade. CEH determined that groundwater below this portion of the property was flowing south towards the Mumford River.

GROUNDWATER PATHWAY (Continued)

CEH calculated that the groundwater seepage velocity below the Arcade property was approximately 23 feet per year.

During the hydrogeological investigation of the Covitch property five of the monitoring well locations met refusal above the water table, preventing the installation of these wells. As a result, only ten monitoring wells were completed. CEH theorized that refusal was a result of a bedrock surface or a boulder layer above the bedrock. According to CEH this theory was reinforced by the presence of a dam and large smoke stack adjacent to the attempted monitoring well locations, both of which require a shallow bedrock foundation.

One of the monitoring wells that CEH installed on the Arcade property was required by the MA DEQE to be advanced until refusal was encountered. CEH chose the monitoring well located on the former island for this purpose. Split-spoon and hollow-stem auger refusal was encountered 18 feet below grade. CEH theorized that this corresponded to the bedrock surface in this area. According to CEH this decision was supported by a visible bedrock outcrop approximately 200 feet south of the area of interest.

No bedrock formations mapped within a 4-mile radius of the property exhibit karst characteristics.

On 24 April 1985, an oil sheen was observed by an unknown party on the surface water contained within the Raceway. As a result of this observation an investigation was initiated to determine the cause of the oil sheen. CEH completed a solid stem auger probe investigation in the area of concern in May 1985. This investigation indicated that a layer of oil and grease was present both above and below the water table in the vicinity of the Raceway. As a result of the presence of the oil and grease layer the hydrogeological investigation of the Covitch property was initiated.

As previously mentioned, the Covitch property investigation included the proposed installation of 15 groundwater monitoring wells, 10 of which were actually completed. EFS collected groundwater samples from these wells on 30 July 1985. The samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium and total cyanide. Two well samples (MC-7 and MC-14) were also analyzed for oil, grease, and phenols. The September 1985 CEH report for the investigation indicated that no problem levels of VOCs, priority pollutant metals, cyanide, barium, or phenol were detected. CEH further stated that monitoring well MC-14 contained 24 mg/l of oil and grease. This well is not located in the vicinity of the Raceway.

The September 1985 CEH report also details the results of an auger probe investigation in the vicinity of the Raceway. This investigation confirmed other findings which indicated that there was an area of oil and grease contamination both above and below the water table in the vicinity of the Raceway.

GROUNDWATER PATHWAY (Continued)

According to the September 1985 CEH report there have been documented oil releases on both sides of the Raceway, one in the basement of the powerhouse and one in an area between Building No. 9 and the Raceway where oil-soaked metal turnings were temporarily stored prior to off-site disposal. CEH stated in the report that a source on the powerhouse side of the Raceway was strongly suspected of causing the oil and grease contamination.

On 9 December 1985, NEPCCO was contracted by WCI to install a cut-off trench/well system with a double pump recovery unit, in order to remediate the groundwater contamination problem in the vicinity of Building No. 9, the Raceway, and the Mumford River. The system was installed between 23 December 1985 and 20 June 1986.

Three overburden observation wells (OW-1 through OW-3) were also installed as part of the remediation system. The only analytical data that START personnel were able to locate, relative to the collection of groundwater samples from the observation wells, is contained within the Project Summary Report prepared by NEPCCO. A data table contained within the report indicates that groundwater samples were collected from the wells on 17 February 1987 and analyzed by an unknown laboratory for VOCs by EPA Methods 601 and 602. According to the data table, seven VOCs were detected in one or more of the observation wells at concentrations greater than the reference concentration. START personnel chose the groundwater sample collected from observation well OW-2 as the background location due to its minimal contamination. Detected concentrations ranged from 3 to 57 ppb.

The project report indicated that the recovery system was operational from 13 June 1986 until approximately 11 February 1987. According to the 1991 EPA SI report, the recovery and treatment system was shut down in the spring of 1987 at the request of NEPCCO due to decreased levels of VOCs detected in the influent groundwater samples collected from the recovery system. START personnel did not find any information indicating that the treated effluent ever exceeded discharge permit standards.

The hydrogeological investigation of the Arcade property was conducted by CEH during the summer 1985. On 18 July 1985, EFS collected groundwater samples from the eight groundwater monitoring wells (M-1 through M-8) installed on the Arcade property. These samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium, and total cyanide. The October 1985 CEH report indicated that the groundwater below the Arcade property contained detectable levels of four VOCs. Vinyl chloride, trans-1,2-dichloroethene, trichloroethene, and tetrachloroethene were detected in one or more of the monitoring well samples at concentrations greater than the reference concentration. START personnel chose the groundwater sample collected from monitoring well M-1 as the background location due to its crossgradient location and its uncontaminated condition. Detected concentrations ranged from 10 ppb for trichloroethene (M-3) to 950 ppb for tetrachloroethene (M-6). Barium was also detected in several groundwater samples at concentrations three times greater than the barium concentration of the reference sample (M-1). Barium was present at the highest concentration (2,900 ppb) in the sample from monitoring well M-5.

GROUNDWATER PATHWAY (Continued)

As a result of the detection of VOCs in the groundwater below the Arcade property, an additional round of groundwater samples were collected on 13 November 1985 and sent to RAI for VOC analysis by EPA Method 624. The groundwater samples were also analyzed by RAI for arsenic, barium, and zinc. The January 1986 CEH report indicated that some of the VOCs previously detected in several of the monitoring wells were not detected in the 13 November 1985 samples collected from the same wells. However, the January 1986 CEH report further indicated that the concentrations of vinyl chloride and trans-1,2-dichloroethene detected in monitoring well M-8 were increasing. The concentrations detected in the 13 November 1985 groundwater samples collected from monitoring well M-8 ranged from 380 ppb for vinyl chloride to 1,100 ppb for trans-1,2-dichloroethene. No VOCs were detected in the background sample (M-1) collected with the November 1985 groundwater samples. Barium and zinc were also detected at concentrations three times greater than reference sample (M-1) concentrations. Barium was present at the highest concentration (3,100 ppb) in the monitoring well M-5 sample. Zinc was also present at the highest concentration (11 ppb) in the M-5 sample.

A third round of groundwater samples were collected by CEH from the Arcade property on 24 January 1987, as part of an additional investigation of the area around monitoring well M-8. This investigation included the installation and sampling of three additional monitoring wells (M-9 through M-11). The new wells were located radially in the vicinity of monitoring well M-8. The groundwater samples collected on 24 January 1987 were submitted to RAI for VOC analysis by EPA Method 624.

The March 1987 CEH report stated that only one of the newly installed wells (M-9) contained VOC contamination. Tetrachloroethene was detected in monitoring well M-9 at a concentration greater than the reference concentration. START personnel chose the groundwater sample collected from monitoring well M-10 as the background location due to its upgradient location and its uncontaminated condition. Tetrachloroethene was detected in M-9 at a concentration of 48 ppb. This compound had previously only been detected in monitoring well M-6.

The March 1987 report also stated that the concentrations of vinyl chloride (280 ppb) and trans-1,2-dichloroethene (640 ppb) detected in monitoring well M-8 were decreasing. In addition, trichloroethene was detected at 17 ppb in the March 1987 monitoring well M-8 groundwater sample. Trichloroethene had not been present in monitoring well M-8 prior to this sampling round.

In July 1987 CEH submitted a risk assessment report concerning the area around monitoring well M-8. This report stated that the VOC-contaminated plume covered approximately 13,100 square feet. CEH also theorized in the report that the plume consisted predominantly of a parent compound (trichloroethene) and two weathered species (vinyl chloride and trans-1,2-dichloroethene). The report further stated that the mass balance of chemical compounds present in monitoring well M-8 had shifted towards the weathered species. CEH attributed this to a long period of emplacement or an accelerated weathering process. The CEH report further stated that the chemicals were migrating towards the Mumford River where the contamination would ultimately be diluted, diminishing its impact on human health and the environment.

GROUNDWATER PATHWAY (Continued)

There are approximately 19,466 people relying upon municipal drinking water wells located within 4-radial miles of the property. These wells are located in the towns of Douglas, Grafton, Northbridge, Sutton, and Uxbridge. The nearest municipal well is the Whitinsville Station located in Northbridge, Massachusetts. This well is located approximately 0.9 miles northwest of the property. The well is operated by the Whitinsville Water Company and serves approximately 2,814 people in the Town of Northbridge.

The population served by each municipal well was estimated by multiplying the average number of persons per household in each household by the approximate number of year-round water department accounts in each respective town. The average number of persons per household was obtained from 1990 U.S. Census data, and the approximate number of year-round water department accounts were obtained in telephone conversations with the respective town water departments.

Private groundwater supplies within 4-radial miles of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings of the property. According to the CENTRACTS report there are approximately 4,879 people relying upon private groundwater wells for drinking water purposes within 4-radial miles of the property. The Northbridge Board of Health and the Whitinsville Water Company were unable to provide information regarding the exact location of the nearest private well. The CENTRACTS report indicates that there are 16 people utilizing private wells within 0.25-radial miles of the property.

The following Tables summarize public and private groundwater usage within 4-Radial miles of the property.

Public Groundwater Supply Sources Within 4-Radial Miles of the Covitch Property /Former ATF Davidson Co. Property.

Distance/Direction from Site	Source Name	Location of Source ^a	Estimated Population Served	Source Type ^b
0.9 miles Northwest	Whitinsville Station	Northbridge, MA	2,814	Unknown
1.9 miles Northwest	Sutton Station	Sutton, MA	6,056	Unknown
3.3 miles Southeast	S. Main Street Wells (3)	Uxbridge, MA	5,372*	Unknown
3.4 miles Southwest	West Street Well No. 2	Douglas, MA	1,162	Unknown
3.5 miles Southwest	West Street Well No. 1	Douglas, MA	1,338	Unknown
3.7 miles North	Providence Road Well	Grafton, MA	918	Unknown
3.8 miles South-Southwest	Putnam Hill Road Wells (3)	Sutton, MA	496*	Unknown
3.9 miles Southeast	Blackstone Street Wells (3)	Uxbridge, MA	1,310*	Unknown

^a Indicates Town in which well is located.

^b Overburden, Bedrock, or Unknown.

*Combined total population served by the three wells.

GROUNDWATER PATHWAY (Continued)

Estimated Drinking Water Populations Served by Groundwater Sources Within 4-Radial Miles of the Covitch Property/Former ATF Davidson Co. Property.

Radial Distance From Covitch Property/Former ATF Davidson Co. property	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	16	0	16
0.25 < 0.50	36	0	36
0.50 < 1.00	179	2,814	2,993
1.00 < 2.00	857	6,056	6,913
2.00 < 3.00	1,434	0	1,434
3.00 < 4.00	2,357	10,596	12,953
Totals	4,879	19,466	24,345

SI TABLE 4: GROUNDWATER OBSERVED RELEASE SUBSTANCES (BY AQUIFER)

Note: Mobility equals 1 for all observed release substances.

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	Tox. × Mob. = Tox.	References
M-8 (11/85)	Vinyl Chloride	380 ppb	M-1 (11/85)	SDL (10 ppb)	10,000	
M-6 (7/85)	Tetrachloroethene	950 ppb	M-1 (7/85)	SDL (5 ppb)	100	
M-8 (11/85)	Trans-1,2-dichloroethene	1,100 ppb	M-1 (11/85)	SDL (5 ppb)	100	
M-8 (7/85)	Trichloroethene	30 ppb	M-1 (7/85)	SDL (5 ppb)	10	
OW-1 (2/87)	1,1-Dichloroethene	17 ppb	OW-2 (2/87)	5 ppb	100	
OW-1 (2/87)	1,1,1-Trichloroethane	12 ppb	OW-2 (2/87)	2 ppb	1	
OW-1 (2/87)	Benzene	12 ppb	OW-2 (2/87)	SDL (1 ppb)*	100	
OW-1 (2/87)	Toluene	57 ppb	OW-2 (2/87)	SDL (1 ppb)*	10	
OW-1 (2/87)	Xylene	40 ppb	OW-2 (2/87)	SDL (1 ppb)*	10	
M-5 (11/85)	Zinc	11 ppb	M-1 (11/85)	< 10 ppb	10	
M-5 (11/85)	Barium	3,100 ppb	M-1 (11/85)	< 10 ppb	10,000	
Highest Value					10,000	

Notes: * Data Table contained within the NEPPCO Project Summary Report indicated that the sample detection limits were 1 ppb.

ppb = parts per billion
 SDL = Sample Detection Limit

SI TABLE 5: GROUNDWATER ACTUAL CONTAMINATION TARGETS

Notes: Convert all results and SCDM values to ppb or µg/L.

If sum of percents calculated for I or J index is ≥ 100%, consider the well a Level I target; if sum of I or J index is < 100%, consider the well a Level II target.

Well ID:	Level I:	Level II:	Population Served:	References:				
Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	RfD (J Index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
Highest Percent					Sum of Percents		Sum of Percents	

SCDM Version: JUN96

GROUNDWATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE		Score	Data Type	Refs
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.	550		
2.	POTENTIAL TO RELEASE: Depth to aquifer: <u>5 to 8</u> feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.1.2.			
LR =		550		

TARGETS		Score	Data Type	Refs
Are any wells part of a blended system? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, attach a page to show apportionment calculations.				
3.	ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: <u>0</u> people \times 10 = <u>0</u> Level II: <u>0</u> people \times 1 = <u>0</u> Total =	0		
4.	POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	303		
5.	NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well Score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	20		
6.	WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a groundwater observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	5		
7.	RESOURCES: Assign a score of 5 if one or more groundwater resource applies; assign 0 if none applies. <ul style="list-style-type: none"> • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering or commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use 	5		
Sum of Targets T =		333		

**SI TABLE 6 (FROM HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUNDWATER
TARGET POPULATIONS**

SI Table 6a: Other Than Karst Aquifers

Distance From Site	Pop.	Nearest Well (choose highest)	POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORY												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to 1/4 mile	16	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	17	
> 1/4 to 1/2 mile	36	18	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122	33	
> 1/2 to 1 mile	2,993	9	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385	523	
> 1 to 2 miles	6,913	5	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842	939	
> 2 to 3 miles	1,434	3	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219	212	
> 3 to 4 miles	12,953	2	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596	1,306	
Nearest Well =		20	Sum =												3,030	

Notes: The exact location of the nearest well was unable to be determined. However, the CENTRACTS Report prepared by Frost Associates for the property indicates that 16 people utilize private wells within a one-quarter mile radius of the property.

**SI TABLE 6 (FROM HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUNDWATER
TARGET POPULATIONS (Continued)**

SI Table 6b: Karst Aquifers

Distance From Site	Pop.	Nearest Well (choose highest)	POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORY												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to 1/4 mile	0	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0	
> 1/4 to 1/2 mile	0	20	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122	0	
> 1/2 to 1 mile	0	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	
> 1 to 2 miles	0	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	
> 2 to 3 miles	0	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	
> 3 to 4 miles	0	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	
Nearest Well =		0													Sum =	0

GROUNDWATER PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS	Score	Data Type	Does Not Apply																																	
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to groundwater.	100																																			
9. Assign the highest groundwater toxicity/mobility value from SI Table 3 or 4. Substance(s): <u>Vinyl Chloride</u> <u>Barium</u> <u>Tetrachloroethene</u> Value: <u>10,000</u> <u>10,000</u> <u>100</u> From Table: <u>4</u> <u>4</u> <u>4</u>	10,000																																			
10. Multiply the groundwater toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7) <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Product</th> <th>WC Score</th> <th>*</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td></td></tr> <tr><td>>0 to <10</td><td>1</td><td></td></tr> <tr><td>≥ 10 to <100</td><td>2</td><td></td></tr> <tr><td>≥ 100 to <1,000</td><td>3</td><td></td></tr> <tr><td>≥ 1,000 to <10,000</td><td>6</td><td></td></tr> <tr><td>≥ 10,000 to <1E+05</td><td>10</td><td></td></tr> <tr><td>≥ 1E+05 to <1E+06</td><td>18</td><td></td></tr> <tr><td>≥ 1E+06 to <1E+07</td><td>32</td><td>✓</td></tr> <tr><td>≥ 1E+07 to <1E+08</td><td>56</td><td></td></tr> <tr><td>≥ 1E+08 or greater</td><td>100</td><td></td></tr> </tbody> </table> <p style="font-size: small;">*check (✓) the WC score calculated for the pathway</p>	Product	WC Score	*	0	0		>0 to <10	1		≥ 10 to <100	2		≥ 100 to <1,000	3		≥ 1,000 to <10,000	6		≥ 10,000 to <1E+05	10		≥ 1E+05 to <1E+06	18		≥ 1E+06 to <1E+07	32	✓	≥ 1E+07 to <1E+08	56		≥ 1E+08 or greater	100				
Product	WC Score	*																																		
0	0																																			
>0 to <10	1																																			
≥ 10 to <100	2																																			
≥ 100 to <1,000	3																																			
≥ 1,000 to <10,000	6																																			
≥ 10,000 to <1E+05	10																																			
≥ 1E+05 to <1E+06	18																																			
≥ 1E+06 to <1E+07	32	✓																																		
≥ 1E+07 to <1E+08	56																																			
≥ 1E+08 or greater	100																																			
WC =	32																																			

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the groundwater pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

GROUNDWATER PATHWAY CALCULATION:

$$\frac{LR \times T \times WC}{82,500}$$

= 71.04

Notes:

Calculation: $(550 \times 333 \times 32) \div 82,500 = 71.04$

(Maximum of 100)

SURFACE WATER PATHWAY

Pathway Description and Scoring Notes: Describe the Surface Water Migration Pathway. Identify the nearest source area with non-zero containment for the Surface Water Pathway and the location of the PPE. Include the length of the overland segment. Describe the in-water segment up to the target distance limit noting the stream flow characteristics of each reach and the locations of drinking water intakes, fisheries and sensitive environments along the 15-mile pathway.

Briefly discuss any sampling events relative to the Surface Water Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Surface Water Pathway for this site, or any factors which influenced your scoring rationale.

Note: If a site has more than one watershed or has both overland/flood and groundwater to surface water migration potential, document each scenario and use the higher scoring watershed/migration route to calculate the surface water migration pathway score. Provide a summary of the scores for all other watershed/migration routes.

The property is primarily located along the northern shore of the Mumford River, bordering the river for approximately 1.1 miles. There is also a land parcel located along the southern shore of the river which is associated with the property. A paved parking area (eastern extent) and an unpaved area used to store piles of renovation debris (western extent) border the southern shore of the Mumford River. A dam, owned by WRT, is located between the Covitch property on the northern shore and the parking lot on the southern shore. The impoundment reservoir created by this dam is referred to as Meadow Pond. The property is located in portions of both the 100-year and 500-year floodplain.

This length of the Mumford River frontage contains numerous Probable Point of Entry (PPE) areas. There are various discharge pipes and drainage swales located along the northern shore of the Mumford River. For this evaluation, the most-upstream PPE area is the western extent of the filled area containing spent foundry sand and other materials. The most downstream PPE area is the Raceway outfall below the dam. This has the consequence of extending the 15-mile downstream surface water pathway (downstream pathway) for an additional mile.

The downstream pathway includes flow along the Mumford River for approximately 4.5 miles until its convergence with the Blackstone River and flow for approximately 10.5 miles along the Blackstone River, until the 15-mile terminus is reached in Woonsocket, Rhode Island. The Mumford River flows through several ponds including Meadow Pond, Linwood Pond, Whitin Pond, Caprons Pond, and several unnamed ponds prior to converging with the Blackstone River. The mean annual flowrate of the Mumford River is approximately 45 cubic feet per second (cfs) and the mean annual flowrate of the Blackstone River is 433 cfs.

There are no known municipal drinking water intakes located along the downstream pathway. However, a surface water intake, used for the irrigation of commercial food crops at the Sherman-Baker Farm, is located along the Mumford River in North Uxbridge, Massachusetts. The surface water intake is approximately 2 miles downstream of the large dam on the Covitch property.

SURFACE WATER PATHWAY (Continued)

There are no sensitive environments located along the approximately 1.1 miles of Mumford River frontage which bisects the property. The nearest sensitive environment is an approximate 6-acre *Palustrine* forested wetland located approximately 0.8 miles downstream of the property. There are approximately 2.86 miles of wetland frontage along the Mumford River portion of the downstream pathway and approximately 5.44 miles of wetland frontage along the Blackstone River portion of the downstream pathway. There are two occurrences of State-listed Species of Concern along the Mumford River portion of the downstream pathway. Along the Blackstone River portion of the downstream pathway, there are two occurrences of State-listed Threatened/Endangered Species and six occurrences of State-listed Species of Concern.

Visual evidence observed during the START on-site reconnaissance indicates that the Mumford River is a recreational fishery. The evidence consisted of a handwritten sign on the property pointing out a good fishing location and a number of fishing poles which were utilized by WRT personnel. Also, the representative of WRT indicated that employees of the businesses located on the property often fish from the northern shore of the Mumford River during their lunch periods. START personnel assume for this evaluation that the Blackstone River is a recreational fishery, as well.

The Covitch property has operated as a large industrial mill complex since the 1800s. Several of the manufacturing processes carried out within the mill complex have potentially impacted the Mumford River. A large foundry operated on the property through approximately the mid-1970s. Foundry wastes were mixed with spent foundry sand and disposed of by landfilling the material on the property and grading the material into the river. As a result of this disposal practice a channel within the river was filled; connecting a small island to the northern shore of the river. The 1991 EPA SI report for the property details the landfilled material as consisting of 90% spent foundry sand, 5% coal ash, and 5% paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. According to the 1985 CEH report, approximately 3,200 feet of river frontage on the property consisted of filled material. Additionally, the 1991 EPA SI report indicated that the filled area contained approximately 40,000 cubic yards of material in an area of approximately 730,000 square feet.

The 1991 EPA SI report for the property stated that untreated electroplating wastewater had been discharged to the Mumford River from the property between 1930 to 1965. According to the EPA SI report, an on-site wastewater treatment plant was installed on the property in 1965 and treated wastewater was discharged to the Mumford River from 1965 until September 1982. Between 1974 and 1982 discharge of treated wastewater was carried out under a NPDES permit (No. MA0001252). The 1991 EPA SI report indicated that the wastewater treatment plant ceased operations in September 1982. The SI report did not indicate why operations ceased. The present owners of the property were unable to provide any additional information concerning the discharge of industrial wastewater to the Mumford River. START personnel were unable to find any additional information concerning the discharge of treated or untreated wastewater to the Mumford River.

SURFACE WATER PATHWAY (Continued)

An additional area associated with the on-site mill complex, which has potentially impacted the Mumford River/Meadow Pond is the Raceway located on the Covitch property. The Raceway was used for on-site power generation for manufacturing operations during the 1800s. Water from the impoundment reservoir, created by the on-site dam, was diverted inland under several of the on-site buildings via the Raceway. This water was used to directly power manufacturing equipment. The water was then discharged back to the Mumford River below the dam. The Raceway was later used to generate electricity in an on-site power plant.

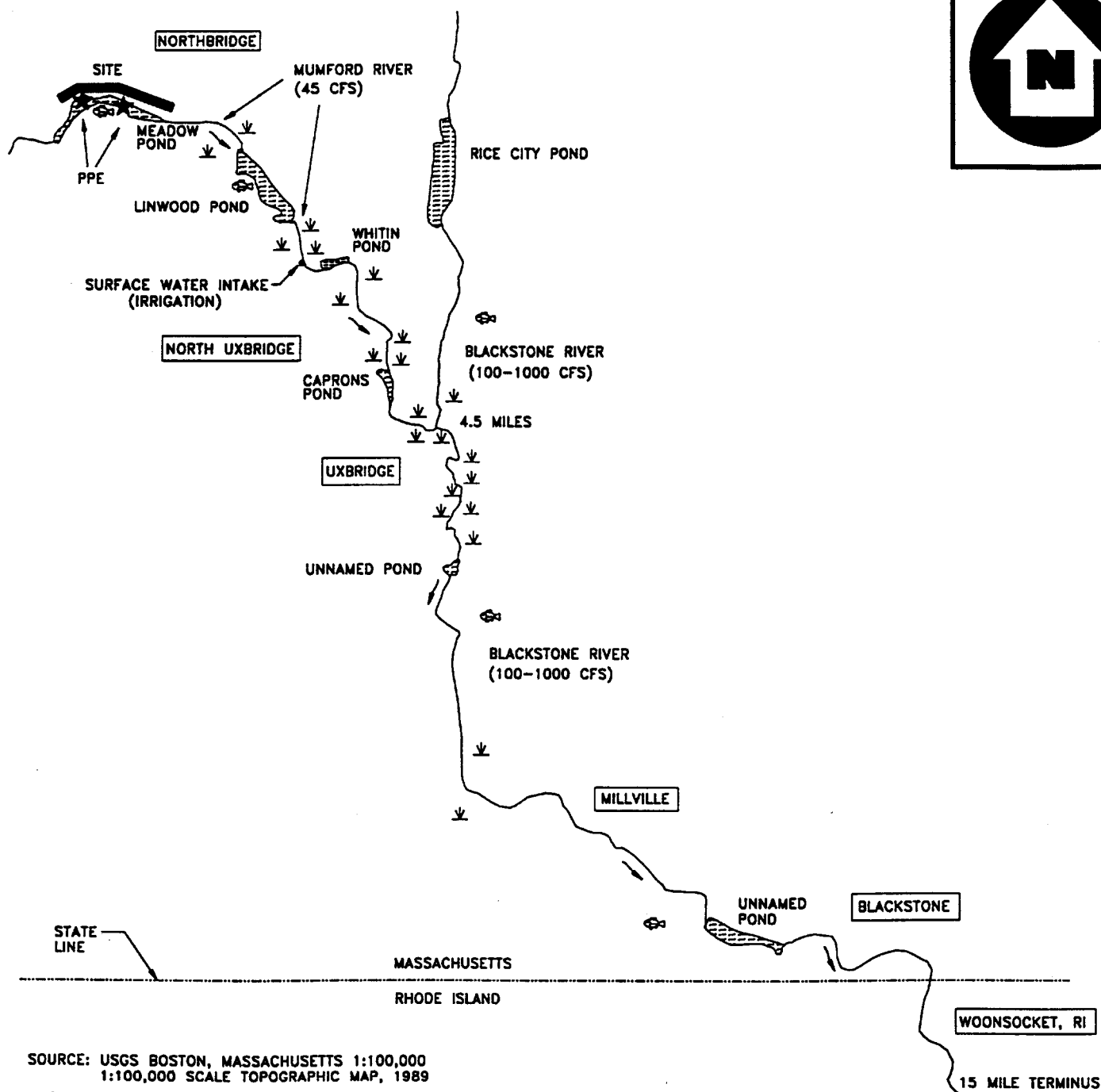
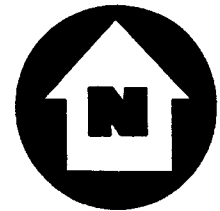
In April 1985, an oily sheen was observed by an unknown party on the surface of the water in the Raceway. This discovery led to the CEH hydrogeological investigation of the Covitch property. In the September 1985 CEH report it was determined that the sheen observed in the Raceway was the result of draining metal turnings outside between Building No. 9 and the Raceway. No record of surface water or sediment samples being collected from the Raceway or the Mumford River as a result of the oily sheen could be found by START personnel.

In spring 1985, MA DEQE requested that a hydrogeological investigation be completed for the Arcade property. WCI retained CEH to collect five benthic core/sediment samples from the Mumford River/Meadow Pond. The sediment samples were collected from the Mumford River on 18 July 1985 by representatives of CEH. These samples were analyzed for priority pollutant metals and barium by RAI between 23 July 1985 and 12 August 1985. Results of the analyses indicated that there were high levels of several metals in the sediments of the Mumford River. Cadmium, chromium, copper, lead, nickel, and zinc were all detected at more than three times the concentration in the upstream reference sample. The concentrations of these metals ranged from 1.9 parts per million (ppm) for cadmium to 920 ppm for zinc.

Additional sediment samples were collected from the Mumford River on 13 November 1985 by representatives of CEH. Eleven sediment samples were collected and sent to RAI for analysis during this sampling round. The samples were analyzed for chromium via EPA Method 3050. The samples were also subjected to an Extraction Procedure for Toxicity (EP Toxicity) test for chromium. Results of the Method 3050 analyses indicated that chromium concentrations ranged from 49 to 2,300 ppm. No background (reference) sample was collected for the summer 1985 sediment sampling event.

CEH reported that the EP Toxicity results indicated that a retardation agent was affecting the mobility of the chromium present in the river bottom sediments. CEH based this on the fact that even though chromium was detected via EPA Method 3050 procedures, virtually none of the chromium was extractable.

The 1985 metals analyses conducted on the river bottom sediments will not be used for this evaluation. No analytical evidence has been found by START personnel, to date, that links the metals found in the river bottom sediment samples to materials utilized on the property.



LEGEND

- | | | | | | |
|--|---------|--|----------------|--|-------------------------|
| | FISHERY | | SURFACE WATER | | PROBABLE POINT OF ENTRY |
| | WETLAND | | FLOW DIRECTION | | |

SURFACE WATER PATHWAY
COVITCH PROPERTY
FORMER ATF DAVIDSON CO.
MAIN STREET
NORTHBRIDGE, MASSACHUSETTS



REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #
95-07-0065

DRAWN BY:
T. CAMPBELL

DATE
6/19/96

FILE NAME:
S:\95070065\FIG3.DWG

FIGURE 5

SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

List all substances that meet the criteria for an observed release to surface water; however do not eliminate a substance from this table if it has a BCF of less than 500.

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	BCF HRS Table 4-15	Toxicity × Persistence	Toxicity × Persis. × Bioaccum	Ecotoxicity × Persis. × Ecobioaccum	References
Highest Values									

Notes: There are no known Surface Water Observed Release Substances associated with the property.

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Notes: Convert all results and SCDM values to ppb or µg/L.

If sum of percents calculated for I or J index is \geq 100 percent, consider the intake a Level I target; if sum of I or J index is < 100 percent consider the intake a Level II target.

Intake ID: Sample Type: Level I: Level II: Population Served: References:

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	RfD (J Index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
Highest Percent					Sum of Percents		Sum of Percents	

SCDM Version: JUN96

Notes: There are no known Surface Water Drinking Water Actual Contamination Target samples associated with the property.

SURFACE WATER PATHWAY LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE - OVERLAND/FLOOD MIGRATION

LIKELIHOOD OF RELEASE - OVERLAND/FLOOD MIGRATION		Score	Data Type	Refs												
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	500														
2.	<p>POTENTIAL TO RELEASE: Distance to surface water: <u>< 50</u> (feet)</p> <p>If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.</p> <table><tr><td>Distance to surface water <2500 feet</td><td>500</td></tr><tr><td>Distance to surface water >2500 feet, and:</td><td></td></tr><tr><td>Site in annual or 10-yr floodplain</td><td>500</td></tr><tr><td>Site in 100-yr floodplain</td><td>400</td></tr><tr><td>Site in 500-yr floodplain</td><td>300</td></tr><tr><td>Site outside 500-yr floodplain</td><td>100</td></tr></table> <p>Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2</p>	Distance to surface water <2500 feet	500	Distance to surface water >2500 feet, and:		Site in annual or 10-yr floodplain	500	Site in 100-yr floodplain	400	Site in 500-yr floodplain	300	Site outside 500-yr floodplain	100			
Distance to surface water <2500 feet	500															
Distance to surface water >2500 feet, and:																
Site in annual or 10-yr floodplain	500															
Site in 100-yr floodplain	400															
Site in 500-yr floodplain	300															
Site outside 500-yr floodplain	100															
LR =		500														

LIKELIHOOD OF RELEASE - GROUNDWATER TO SURFACE WATER MIGRATION

		Score	Data Type	Refs
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	500		
NOTE:	Evaluate groundwater to surface water migration only for a surface water body that meets all of the following conditions:			
1)	A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0.			
2)	No aquifer discontinuity is established between the source and the above portion of the surface water body.			
3)	<p>The top of the uppermost aquifer is at or above the bottom of the surface water.</p> <p>Elevation of top of uppermost aquifer: _____</p> <p>Elevation of bottom of surface water body: _____</p>			
2.	POTENTIAL TO RELEASE: Depth to aquifer: _____ feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less assign a score of 500; otherwise assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.1.2.			
LR =		500		

Notes: Both the Overland/Flood Migration and the Groundwater to Surface Water Migration Pathways yield a likelihood of release score of 500. The Overland/Flood will be used as this is the more likely pathway due to the close proximity of the Mumford River.

**SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET
(Continued)**

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs																				
<p>Record the water body type, flow, and number of people served by each drinking water intake within the distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">Intake Name</th> <th style="text-align: center;">Water Body Type</th> <th style="text-align: center;">Flow</th> <th style="text-align: center;">People Served</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">N/A</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Are any intakes part of a blended system? Yes ____ No ____ If yes, attach a page to show appointment calculations.</p> <p>3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8).</p> <p>Level I: <u>0</u> people \times 10 = <u>0</u> Level II: <u>0</u> people \times 1 = <u>0</u> Total =</p>	Intake Name	Water Body Type	Flow	People Served	N/A																0		
Intake Name	Water Body Type	Flow	People Served																				
N/A																							
<p>4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.</p>	0																						
<p>5. NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.</p>	0																						
<p>6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies.</p> <ul style="list-style-type: none"> • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use. 	5																						
Sum of Targets T =	5																						

Notes: The Sherman-Baker Farm located in North Uxbridge, Massachusetts utilizes water drawn from the Mumford River to irrigate food crops.

SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY^(a)

Type of Surface Water Body ^(b)	Pop.	Nearest Intake	NUMBER OF PEOPLE								Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)		20	4	17	53	164	522	1,633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)		2	0.4	2	5	16	52	163	521	1,633	
Moderate to large stream (> 100 to 1,000 cfs)		0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)		0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs)		0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Very Large River (>100,000 cfs)		0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)		0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)		0	0	0	0	0.001	0.003	0.008	0.03	0.08	
3-mile mixing zone in quiet flowing river (\geq 10 cfs)		10	2	9	26	82	261	817	2,607	8,163	

SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY^(a) (Continued)

Type of Surface Water Body	Pop.	NUMBER OF PEOPLE					Pop. Value
		30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	3,000,001 to 10,000,000	
Minimal Stream (< 10 cfs)		52,137	163,246	521,360	1,632,455	5,213,590	
Small to moderate stream (10 to 100 cfs)		5,214	16,325	52,136	163,245	521,359	
Moderate to large stream (> 100 to 1,000 cfs)		521	1,633	5,214	16,325	52,136	
Large Stream to river (> 1,000 to 10,000 cfs)		52	163	521	1,632	5,214	
Large River (> 10,000 to 100,000 cfs)		5	16	52	163	521	
Very Large River (> 100,000 cfs)		0.5	2	5	16	52	
Shallow ocean zone or Great Lake (depth < 20 feet)		5	16	52	163	521	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0.5	2	5	16	52	
Deep ocean zone or Great Lake (depth > 200 feet)		0.3	1	3	8	26	
3-mile mixing zone in quiet flowing river (\geq 10 cfs)		26,068	81,623	260,680	816,227	2,606,795	
Sum =							N/A

^aRound the number of people to nearest integer. Do not round the assigned dilution-weighted population value to nearest integer.

^bTreat each lake as a separate type of water body and assign it a dilution-weighted population value using the surface water body type with the same dilution weight from HRS Table 4-13 as the lake. If drinking water is withdrawn from coastal tidal water or the ocean, assign a dilution-weighted population value to it using the surface water body type with the same dilution weight from HRS Table 4-13 as the coastal tidal water or the ocean zone.

SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Notes: Convert all results and SCDM values to $\mu\text{g}/\text{kg}$ or ppb .

If sum of percents calculated for I or J index is $\geq 100\%$, consider the fishery a Level I target; if sum of I or J index is < 100 percent consider the fishery a Level II target. List only those substances that meet the observed release criteria in a fishery within the target distance limit and have a BCF of ≥ 500 ; BCF values are found on SI Table 7.

Fishery ID:		Sample Type:		Level I:	Level II:	References:		
Sample ID	Hazardous Substance	Conc. ($\mu\text{g}/\text{kg}$)	Benchmark Conc. (FDAAL)	% of Benchmark	RfD (J index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
Highest Percent				--	Sum of Percents		Sum of Percents	--

Notes: There are no known Human Food Chain Actual Contamination Target samples for the property.

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Notes: Convert all results and SCDM values to $\mu\text{g}/\text{L}$ or ppb .

If the highest % of benchmark calculated is $\geq 100\%$, consider the sensitive env. a Level I target; if the highest % of benchmark calculated is $< 100\%$ consider the sensitive env. a Level II target.

Environment ID:		Sample Type:		Level I:	Level II:	Environment Value:
Sample ID	Hazardous Substance	Conc. ($\mu\text{g}/\text{L}$)	Benchmark Conc. (AWQC or AALAC)	% of Benchmark	References	
Highest Percent						

SCDM Version: JUN96

Notes: There are no known Sensitive Environment Actual Contamination Target samples associated with the property.

SURFACE WATER PATHWAY (Continued)

HUMAN FOOD CHAIN THREAT WORKSHEET

HUMAN FOOD CHAIN THREAT TARGETS		Score	Data Type	Refs
Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.				
Fishery Name: Mumford River Water Body: Small to moderate stream Flow: 45 cfs Species: Unknown Production: Unknown lbs/yr Species: Production: lbs/yr				
Fishery Name: Blackstone Riv. Water Body: Moderate to large stream Flow: 433 cfs Species: Unknown Production: Unknown lbs/yr Species: Production: lbs/yr				
FOOD CHAIN INDIVIDUAL (Select highest value) 7. ACTUAL CONTAMINATION FISHERIES: Assign 50 points for a Level I fishery only if tissue samples document an observed release of a substance with a BCF ≥ 500 to a fishery within the target distance limit (SI Table 10). List substance(s): _____. Assign 45 points for a Level II fishery if surface water/sediment samples document an observed release of a substance with a BCF ≥ 500 to a fishery within the target distance limit (SI Table 10). List substance(s): _____. 8. POTENTIAL CONTAMINATION FISHERIES: Assign 20 points for a potential fishery if there is an observed release of a substance with a BCF ≥ 500 (SI Table 7) to a watershed containing fisheries within the target distance limit, but no Level I or Level II fisheries are scored because there is no fishery documented between the PPE and the most downstream observed release sample point. If there is no observed release of a substance with a BCF ≥ 500 to a watershed, assign a value for potential contamination fisheries from the table below using the lowest flow of all fisheries within the target distance limit.				
Lowest Flow	FCI Value			
< 10 cfs	20			
10 to 100 cfs	2			
> 100 cfs, coastal tidal waters, oceans, or Great Lakes	0			
3-mile mixing zone in quiet flowing river	10			
FCI Value =		2		
Notes:	Targets T =	2		

SURFACE WATER PATHWAY (Continued)

ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

ENVIRONMENTAL THREAT TARGETS				Score	Data Type	Refs																				
Record the water body and flow for each surface water sensitive environment within the target distance limit (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.				0																						
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 35%;">Environment Type (SI Table 13)</td> <td style="width: 40%;">Water Body Name</td> <td style="width: 25%;">Flow</td> </tr> <tr> <td>Wetlands (2.86 miles)</td> <td>Mumford River</td> <td>45 cfs</td> </tr> <tr> <td>CWA Waterbody</td> <td>Mumford River</td> <td>45 cfs</td> </tr> <tr> <td>State Conc. Species</td> <td>Mumford River</td> <td>45 cfs</td> </tr> <tr> <td>Wetlands (5.44 miles)</td> <td>Blackstone River</td> <td>100-1,000 cfs</td> </tr> <tr> <td>State Conc. Species</td> <td>Blackstone River</td> <td>100-1,000 cfs</td> </tr> <tr> <td>State Threat/Endg. Species</td> <td>Blackstone River</td> <td>100-1,000 cfs</td> </tr> </table>			Environment Type (SI Table 13)				Water Body Name	Flow	Wetlands (2.86 miles)	Mumford River	45 cfs	CWA Waterbody	Mumford River	45 cfs	State Conc. Species	Mumford River	45 cfs	Wetlands (5.44 miles)	Blackstone River	100-1,000 cfs	State Conc. Species	Blackstone River	100-1,000 cfs	State Threat/Endg. Species	Blackstone River	100-1,000 cfs
Environment Type (SI Table 13)	Water Body Name	Flow																								
Wetlands (2.86 miles)	Mumford River	45 cfs																								
CWA Waterbody	Mumford River	45 cfs																								
State Conc. Species	Mumford River	45 cfs																								
Wetlands (5.44 miles)	Blackstone River	100-1,000 cfs																								
State Conc. Species	Blackstone River	100-1,000 cfs																								
State Threat/Endg. Species	Blackstone River	100-1,000 cfs																								
9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14). Substance(s): _____ From Table: _____																										
Environment Type (SI Table 13)	Environment Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)	Product																							
		× =																								
		× =																								
		× =																								
		× =																								
Sum =																										
10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:				1.7																						
Flow	Dilution weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.				Product																			
45 cfs	0.1 ×	2.86 mi. of wetlands: 75 ×	0.1 =				0.75																			
45 cfs	0.1 ×	2 occurrences of (A): 2(25) ×	0.1 =				0.50																			
45 cfs	0.1 ×	CWA (5) ×	0.1 =				0.05																			
100-1,000 cfs	0.01 ×	5.44 mi. of wetlands: 150 ×	0.1 =				0.15																			
100-1,000 cfs	0.01 ×	6 occurrences of (A): 6(25) ×	0.1 =				0.15																			
100-1,000 cfs	0.01 ×	2 occurrences of (B): 2(50) ×	0.1 =				0.10																			
Sum =																										
Sum of Targets T =				1.7																						

Notes: (A): Particular areas, small in size, important to the maintenance of unique biotic communities (State concerned species); Value= 25/ occurrence.
 (B): State-listed Endangered Species; Value= 50/occurrence.
 CWA = Clean Water Act.

**SI TABLE 12 (HRS TABLE 4-13):
SURFACE WATER DILUTION WEIGHTS**

*	TYPE OF SURFACE WATER BODY		Assigned Dilution Weight
	Descriptor	Flow Characteristics	
	Minimal stream	< 10 cfs	1
✓	Small to moderate stream	10 to 100 cfs	0.1
✓	Moderate to large stream	> 100 to 1,000 cfs	0.01
	Large stream to river	> 1,000 to 10,000 cfs	0.001
	Large river	> 10,000 to 100,000 cfs	0.0001
	Very large river	> 100,000 cfs	0.00001
	Coastal tidal waters	Flow not applicable; depth not applicable	0.0001
	Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.0001
	Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.00001
	Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
	3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

* Check all (✓) appropriate dilution weights.

**SI TABLE 13 (HRS TABLE 4-23):
SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES**

*	Sensitive Environment	Assigned Value
	Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
	Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
✓	Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
✓	State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
✓	State designated areas for the protection and maintenance of aquatic life under the Clean Water Act	5
✓	Wetlands See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

*Check (✓) all environments impacted or potentially impacted by the site.

SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES

*	TOTAL LENGTH OF WETLANDS	ASSIGNED VALUE
	Less than 0.1 mile	0
	0.1 to 1 mile	25
	Greater than 1 to 2 miles	50
✓	Greater than 2 to 3 miles	75
	Greater than 3 to 4 miles	100
✓	Greater than 4 to 8 miles	150
	Greater than 8 to 12 miles	250
	Greater than 12 to 16 miles	350
	Greater than 16 to 20 miles	450
	Greater than 20 miles	500

* Check (✓) highest value for each applicable flow characteristic.

Notes:

SURFACE WATER PATHWAY (Concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

Score

11. If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater. If no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to surface water.

100

12. Assign the highest value from SI Table 3 or SI Table 7 for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.

	DWT	HFCT	ET
Substance(s):	Barium	Benzene	Benzene
Value:	10,000	2.0E+05	20,000
From Table:	3	3	3

*Footnote all substances which cannot fit on Table.

13. Multiply the toxicity and hazardous waste quantity scores. Assign the waste characteristics score for each threat from the table below.

Product	WC Score	DWT	HFCT	ET
0	0			
> 0 to < 10	1			
≥ 10 to < 100	2			
≥ 100 to < 1,000	3			
≥ 1,000 to < 10,000	6			
≥ 10,000 to < 1E+05	10			
≥ 1E+05 to < 1E+06	18			
≥ 1E+06 to < 1E+07	32	✓		✓
≥ 1E+07 to < 1E+08	56		✓	
≥ 1E+08 to < 1E+09	100			
≥ 1E+09 to < 1E+10	180			
≥ 1E+10 to < 1E+11	320			
≥ 1E+11 to < 1E+12	560			
≥ 1E+12 or greater	1000			

*check (✓) the WC score calculated for each threat

	Substance Value	HWQ	Product	WC Score (from Table)	
Drinking Water Threat Toxicity/Persistence	10,000 ×	100 =	1.0E+06	32	(Maximum of 100)
Food Chain Threat Toxicity/Persistence Bioaccumulation	2.0E+05 ×	100 =	2.0E+07	56	(Maximum of 1000)
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	20,000 ×	100 =	2.0E+06	32	(Maximum of 1000)

SURFACE WATER PATHWAY THREAT SCORES

Threat (T)	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics(WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$	
Drinking Water (DW)	500	5	32	0.970	(Maximum of 100)
Human Food Chain (HFC)	500	2	56	0.679	(Maximum of 100)
Environmental (E)	500	1.7	32	0.33	(Maximum of 60)

Multiply LR by T and by WC. Divide the product by 82,500 for each threat (T). Sum the threat scores to obtain the surface water pathway score for each watershed/migration route. Select the highest watershed/migration route score. If the pathway score is greater than 100, assign 100.

SURFACE WATER PATHWAY CALCULATION:
(DWT + HFCT + ET) =

1.979

(Maximum of 100)

Notes:

Calculations;

DWT: $[500 \times 5 \times 32] \div 82,500 = 0.970$

HFCT: $[500 \times 2 \times 56] \div 82,500 = 0.679$

ET: $[500 \times 1.7 \times 32] \div 82,500 = 0.33$

DWT+HFCT+ET = $0.970 + 0.679 + 0.33 = 1.979$

SOIL EXPOSURE PATHWAY

Pathway Description and Scoring Notes: Identify all areas of observed contamination. Indicate whether a resident population is associated with the site and characterize the area surrounding the site. Identify the nearby population and any terrestrial sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Soil Exposure Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Soil Exposure Pathway for this site, or any key factors which influenced your scoring rationale.

Soil samples were collected from the Covitch property during the hollow-stem auger probe survey conducted by CEH in May 1985. These locations were determined based on their proximity to the Raceway. Three of the locations (AP-101, AP-102, and AP-103) met refusal prior to reaching the desired depths and were abandoned. The other two locations (AP-104 and AP-105) were advanced to the desired depth and numerous soil samples were collected in 2-foot increments from each location between the depths of 8 and 17 feet. These samples were analyzed for barium, oil and grease, total phenols, and priority pollutant metals. Three of the samples, AP-104 (S-4), AP-105 (S-1), and AP-105 (S-3), were also analyzed for VOCs by EPA Method 624. No VOCs were detected in any of the soil samples which received the VOC analysis. The soil samples indicated that there was a layer of oil and grease present on the property, with the highest concentration (12,000 ppm) present in location AP-104, approximately 11 feet below grade. Barium was also detected at elevated concentrations (560 ppm) in location AP-104, approximately 16 feet below grade. None of the soil samples were collected from depths of 24 inches or less.

Alternatives Unlimited Day Habitation Program is a school located in one of the on-site buildings. The school is used to train special need students. The students and faculty of the school are not likely targets for soil exposure due to the fact that activities are limited to within the on-site building and the building is not believed to be located on a source.

The nearest residence is located within the mill complex on the Covitch property. Four people reside in this residence; an employee of WRT, his wife, and their two children. No known soil samples have been collected from the surficial soils of the property. Based on both historical records and past environmental reports these residents do not appear to be living on a source, or within 200 feet of a source.

Both vehicular and pedestrian access to the portion of the property on the north side of the Mumford River (Covitch and Arcade properties) is restricted. Three sides of the property are enclosed by a 6-foot-high chain-link fence. There is also a combination of on-site employees and a 24-hour security service patrolling the property. However, pedestrian access to the property can be gained via the Mumford River. Additionally, there is unrestricted pedestrian and vehicular access to the former coal ash disposal area which is located along Douglas Road south of the Mumford River.

SOIL EXPOSURE PATHWAY (Continued)

The property is located in a mixed residential, commercial, and industrial section of Northbridge. Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which START personnel will consider targets for soil exposure for this evaluation are the approximately eight people working for WRT on the landscape/grounds maintenance crew.

According to the CENTRACTS report, prepared by Frost Associates, Inc. for the property, there are approximately 5,327 people residing within 1-radial mile of the property. To date, no known soil samples have been collected on residential properties in the vicinity of the subject property. Based on available information and on-site observations, nearby residential properties are not likely targets from the soil exposure pathway.

There are no terrestrial sensitive environments located on the property.

SI TABLE 15a: SOIL EXPOSURE OBSERVED CONTAMINATION SUBSTANCES

Source ID:

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	Toxicity	References
Highest Toxicity						

Notes: There are no known Soil Exposure Observed Contamination Substances associated with the property.

SI TABLE 15b: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Notes: Convert all results and SCDM values to $\mu\text{g}/\text{kg}$ or ppb. If sum of percent calculated for I or J index is $\geq 100\%$, consider residents Level I targets; if sum of I or J index is $< 100\%$, consider the residents Level II targets.

Residence ID:

Level I:

Level II:

Population:

Sample ID	Hazardous Substance	Conc. ($\mu\text{g}/\text{kg}$)	RfD (J index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.	References
Sum of Percents					Sum of Percents		

Residence ID:

Level I:

Level II:

Population:

Sample ID	Hazardous Substance	Conc. ($\mu\text{g}/\text{kg}$)	RfD (Index)	% of RfD	Cancer Risk Conc. (Index)	% of Cancer Risk Conc.	References
Sum of Percents					Sum of Percents		

SCDM Version: JUN96

Notes: There are no known Soil Exposure Resident Population Target samples associated with the property.

SOIL EXPOSURE PATHWAY WORKSHEET

RESIDENT POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Refs														
1. OBSERVED CONTAMINATION: If evidence indicates presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.	0 (550)																
LE =	0 (550)																
TARGETS																	
2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or day care on contaminated property and within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: <u>0</u> people \times 10 = <u>0</u> Level II: <u>0</u> people \times 1 = <u>0</u> Sum =	0																
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level I targets. If no resident population exists (i.e., no Level I or Level II targets), assign 0 (HRS Section 5.1.3).	0																
4. WORKERS: Assign a score from the table below for the total number of workers at the site and nearby facilities and within areas of observed contamination associated with the site.																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Number of Workers</th> <th style="width: 50%;">Score</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: center;">1 to 100</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="text-align: center;">101 to 1,000</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">> 1,000</td> <td style="text-align: center;">15</td> </tr> </tbody> </table>	Number of Workers	Score	0	0	1 to 100	5	101 to 1,000	10	> 1,000	15	5						
Number of Workers	Score																
0	0																
1 to 100	5																
101 to 1,000	10																
> 1,000	15																
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination.																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Terrestrial Sensitive Environment Type</th> <th style="width: 50%;">Value</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <td style="text-align: right;">Sum =</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	Terrestrial Sensitive Environment Type	Value											Sum =	0	0		
Terrestrial Sensitive Environment Type	Value																
Sum =	0																
6. RESOURCES: Assign a score of 5 if any one or more of the following resources is present on area of observed contamination at the site; assign 0 if none applies. <ul style="list-style-type: none"> • Commercial agriculture • Commercial silviculture • Commercial livestock production or commercial livestock grazing 	0																
Sum of Targets T =	5																

Notes: (A) Numbers in parentheses are a hypothetical evaluation to evaluate the effect should the detection of vinyl chloride occur in the surficial soils of the property.
 (B) Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which START personnel will consider targets for soil exposure for this evaluation are the eight people working for WRT on the landscape/grounds maintenance crew.

SOIL EXPOSURE PATHWAY WORKSHEET **NEARBY POPULATION THREAT**

LIKELIHOOD OF EXPOSURE			Score	Data Type	Ref.
7.	Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6)	Value: <u>25</u>			
	Area of Contamination (from SI Table 18 or HRS Table 5-7)	Value: <u>100</u>			
	Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)				
	LE=		250		

TARGETS			Score	Data Type	Ref.
8.	Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1/4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.		1		
9.	Determine the population within 1 mile travel distance that is not exposed to a hazardous substance from the site (i.e., properties that are not determined to be Level I or Level II); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.		7.1		
Sum of Targets T =			8.1		

Notes:

**SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY
TERRESTRIAL SENSITIVE ENVIRONMENT VALUES**

*	TERRESTRIAL SENSITIVE ENVIRONMENT	ASSIGNED VALUE
	Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
	Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
	Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
	State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

* - Check (✓) all environments impacted or potentially impacted by the site.

**SI TABLE 17 (HRS TABLE 5-6);
ATTRACTIVENESS/ACCESSIBILITY VALUES**

*	AREA OF OBSERVED CONTAMINATION	ASSIGNED VALUE
	Designated recreational area	100
	Regularly used for public recreation (for example, vacant lots in urban area)	75
	Accessible and unique recreational area (for example, vacant lots in urban area)	75
	Moderately accessible (may have some access improvements-for example, gravel road) with some public recreation use	50
✓	Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
	Accessible with no public recreation use	10
	Surrounded by maintained fence or combination of maintained fence and natural barriers	5
	Physically inaccessible to public, with no evidence of public recreation use	0

* Check (✓) highest value.

**SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR
VALUES**

*	TOTAL AREA OF THE AREAS OF OBSERVED CONTAMINATION (SQUARE FEET)	ASSIGNED VALUE
	≤ to 5,000	5
	> 5,000 to 125,000	20
	> 125,000 to 250,000	40
	> 250,000 to 375,000	60
	> 375,000 to 500,000	80
✓	> 500,000	100

* Check (✓) highest value.

Notes:

**SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF
EXPOSURE FACTOR VALUES**

Area of Contamination Factor Value	Attractiveness/Accessibility Factor Value						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

**SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES
FOR NEARBY POPULATION THREAT**

Travel Distance Category (miles)	Pop.	NUMBER OF PEOPLE WITHIN THE TRAVEL DISTANCE CATEGORY												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	
Greater than 0 to 1/4	1,328	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034	41
Greater than 1/4 to 1/2	1,350	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	20
Greater than 1/2 to 1	2,649	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	10
Sum =														71

References:

Notes: Including the 1,200 people that work for businesses on the property in the Greater than 0 to 0.25 mile Travel Distance Category does not change the Population Value.

SOIL EXPOSURE PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS

Score

10.	Assign the hazardous waste quantity score calculated for soil exposure	100																																	
11.	Assign the highest toxicity value from SI Table 15a. Substance(s): <u>(Vinyl Chloride)</u> _____ Value: <u>(10,000)</u> _____ From Table: <u>(3)</u> _____	0 (10,000)																																	
12.	Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Product</th> <th style="text-align: center;">WC Score</th> <th style="text-align: center;">*</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td></td></tr> <tr><td style="text-align: center;">>0 to <10</td><td style="text-align: center;">1</td><td></td></tr> <tr><td style="text-align: center;">≥ 10 to <100</td><td style="text-align: center;">2</td><td></td></tr> <tr><td style="text-align: center;">≥ 100 to <1,000</td><td style="text-align: center;">3</td><td></td></tr> <tr><td style="text-align: center;">≥ 1,000 to <10,000</td><td style="text-align: center;">6</td><td></td></tr> <tr><td style="text-align: center;">≥ 10,000 to <1E+05</td><td style="text-align: center;">10</td><td></td></tr> <tr><td style="text-align: center;">≥ 1E+05 to <1E+06</td><td style="text-align: center;">18</td><td></td></tr> <tr><td style="text-align: center;">≥ 1E+06 to <1E+07</td><td style="text-align: center;">32</td><td style="text-align: center;">(✓)</td></tr> <tr><td style="text-align: center;">≥ 1E+07 to <1E+08</td><td style="text-align: center;">56</td><td></td></tr> <tr><td style="text-align: center;">≥ 1E+08 or greater</td><td style="text-align: center;">100</td><td></td></tr> </tbody> </table> <p style="margin-left: 100px;">*check (✓) the WC score calculated for the pathway</p>	Product	WC Score	*	0	0		>0 to <10	1		≥ 10 to <100	2		≥ 100 to <1,000	3		≥ 1,000 to <10,000	6		≥ 10,000 to <1E+05	10		≥ 1E+05 to <1E+06	18		≥ 1E+06 to <1E+07	32	(✓)	≥ 1E+07 to <1E+08	56		≥ 1E+08 or greater	100		0 (1.0E+06)
Product	WC Score	*																																	
0	0																																		
>0 to <10	1																																		
≥ 10 to <100	2																																		
≥ 100 to <1,000	3																																		
≥ 1,000 to <10,000	6																																		
≥ 10,000 to <1E+05	10																																		
≥ 1E+05 to <1E+06	18																																		
≥ 1E+06 to <1E+07	32	(✓)																																	
≥ 1E+07 to <1E+08	56																																		
≥ 1E+08 or greater	100																																		
WC =		0 (32)																																	

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1; (0)5(0)
Targets = Sum of Questions 2, 3, 4, 5, 6) 82,500

$$\frac{LE \times T \times WC}{82,500} =$$

0.0 (1.067)

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7; (250)8.1(0)
Targets = Sum of Questions 8,9) 82,500

$$\frac{LE \times T \times WC}{82,500} =$$

0.0 (0.785)

SOIL EXPOSURE PATHWAY CALCULATION:

Resident Population Threat + Nearby Population Threat =

0.0 (1.852)

(Maximum of 100)

Notes: Numbers in parentheses are a hypothetical evaluation to illustrate the effect should the detection of vinyl chloride occur in the surficial soils of the property. If this compound were detected the Soil Exposure Pathway score would become 1.852

Hypothetical Calculations:

Resident Population: $[550 \times 5 \times 32] \div 82,500 = 1.067$
 Nearby Population: $[250 \times 8.1 \times 32] \div 82,500 = 0.785$
 Resident Population + Nearby Population = $1.067 + 0.785 = 1.852$

AIR MIGRATION PATHWAY

Pathway Description and Scoring Notes: Describe the Air Migration Pathway. Identify the nearest potential receptors of airborne contaminants and the population residing within four miles of the site. Identify any sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Air Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Air Pathway for this site, or any key factors which influenced your scoring rationale.

To date no known air samples have been collected on the property. Four people reside on the subject property; an employee of WRT, his wife, and their two children. There are approximately 1,200 people employed with and working for the businesses located on the property. Based on both historical records and past environmental reports these residents and employees do not appear to be living/working on a source or within 200 feet of a source, with the possible exception being the eight employees of WRT working on the landscape/grounds maintenance crew. According to the CENTRACTS report prepared by Frost Associates, Inc. for the property, an estimated 27,419 people live within 4-radial miles of the property. The estimated population distribution is summarized below.

Estimated Population Within 4-Radial Miles of the Covitch Property/Former ATF Davidson Co. Property

Radial Distance From Covitch Property/Former ATF Davidson Co. (miles)	Estimated Population
0.00 < 0.25	1,328
0.25 < 0.50	1,350
0.50 < 1.00	2,649
1.00 < 2.00	5,320
2.00 < 3.00	8,140
3.00 < 4.00	8,632
TOTAL	27,419

There are no Federal-Proposed, -Threatened, or -Endangered Species within a 4-radial miles of the property. However, there is one occurrence of State-Threatened/Endangered Species and seven occurrences of State-listed Species of Concern.

There are approximately 1,448 acres of wetlands within 4-radial miles of the property.

SI TABLE 21a: AIR PATHWAY OBSERVED RELEASE SUBSTANCES

Note: Mobility equals 1 for all observed release substances.

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	Gaseous or Particulate	Tox. × Mob. = Tox.	References
Highest Value							

Notes: No known Air Pathway Observed Release Substances samples have been collected for the property.

SI TABLE 21b: AIR PATHWAY ACTUAL CONTAMINATION TARGETS

Note: Convert all results and SCDM values to $\mu\text{g}/\text{m}^3$ or ppb.

If sum of percents calculated for I or J index is $\geq 100\%$, consider the targets as Level I; if the sum of I or J index is $< 100\%$ consider the targets as Level II.

Sample ID:		Level I:	Level II:	Distance from Sources (mi):			References:	
Hazardous Substance	Conc. ($\mu\text{g}/\text{m}^3$)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	RfD (I index)	% of RfD	Cancer Risk Conc. (J index)	% of Cancer Risk Conc.
Highest Tox./ Mobility			Highest Percent		Sum of Percents		Sum of Percents	

Sample ID:		Level I:	Level II:	Distance from Sources (mi):			References:	
Hazardous Substance	Conc. ($\mu\text{g}/\text{m}^3$)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	RfD (I index)	% of RfD	Cancer Risk Conc. (J index)	% of Cancer Risk Conc.
Highest Tox./ Mobility			Highest Percent		Sum of Percents		Sum of Percents	

AIR PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21.			
2. POTENTIAL TO RELEASE: If sampling data do not support a release to the air, assign a score of 500. Optionally, evaluate air migration gaseous and particulate potential to release (HRS Section 6.1.2).	500		
LR =	500		

TARGETS	Score	Data Type	Refs												
<div>3. ACTUAL CONTAMINATION POPULATION: Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air.</div> <div>Level I: <u>0</u> people $\times 10 =$ <u>0</u></div> <div>Level II: <u>0</u> people $\times 1 =$ <u>0</u> Total =</div>	0														
<div>4. POTENTIAL TARGET POPULATION: Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air using SI Table 22. Sum the values and multiply by 0.1.</div>	57.2														
<div>5. NEAREST INDIVIDUAL: Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.</div>	20														
<div>6. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air.</div> <table><tr><th>Sensitive Environment Type</th><th>Value</th></tr><tr><td>N/A</td><td></td></tr><tr><td></td><td></td></tr><tr><th>Wetland Acreage</th><th>Value</th></tr><tr><td>N/A</td><td></td></tr><tr><td></td><td></td></tr></table>	Sensitive Environment Type	Value	N/A				Wetland Acreage	Value	N/A				0		
Sensitive Environment Type	Value														
N/A															
Wetland Acreage	Value														
N/A															
<div>7. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS: Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.</div>	0.6595														
<div>8. RESOURCES: Assign a score of 5 if one or more air resources applies within 1/2 mile of a source; assign a 0 if none applies</div> <div><ul style="list-style-type: none">Commercial agricultureCommercial silvicultureMajor or designated recreation area</div>	5														
Sum of Targets T =	82.8595														

Notes:

AIR PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS

Score

<p>9. If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available for air migration.</p>	100																																	
<p>10. Assign the highest air toxicity/mobility value from SI Table 21a or SI Table 3.</p> <p style="margin-left: 40px;">Substance(s): <u>Vinyl Chloride</u></p> <p style="margin-left: 40px;">Value: <u>10,000</u></p> <p style="margin-left: 40px;">From Table: <u>3</u></p>	10,000																																	
<p>11. Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Product</th> <th style="padding: 5px;">WC Score</th> <th style="padding: 5px;">*</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">0</td><td style="padding: 5px;">0</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">>0 to <10</td><td style="padding: 5px;">1</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 10 to <100</td><td style="padding: 5px;">2</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 100 to <1,000</td><td style="padding: 5px;">3</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 1,000 to <10,000</td><td style="padding: 5px;">6</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 10,000 to <1E+05</td><td style="padding: 5px;">10</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 1E+05 to <1E+06</td><td style="padding: 5px;">18</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 1E+06 to <1E+07</td><td style="padding: 5px;">32</td><td style="padding: 5px;">✓</td></tr> <tr><td style="padding: 5px;">≥ 1E+07 to <1E+08</td><td style="padding: 5px;">56</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">≥ 1E+08 or greater</td><td style="padding: 5px;">100</td><td style="padding: 5px;"></td></tr> </tbody> </table> <p style="margin-left: 40px;">*check (✓) the WC score calculated for the pathway</p>	Product	WC Score	*	0	0		>0 to <10	1		≥ 10 to <100	2		≥ 100 to <1,000	3		≥ 1,000 to <10,000	6		≥ 10,000 to <1E+05	10		≥ 1E+05 to <1E+06	18		≥ 1E+06 to <1E+07	32	✓	≥ 1E+07 to <1E+08	56		≥ 1E+08 or greater	100		32
Product	WC Score	*																																
0	0																																	
>0 to <10	1																																	
≥ 10 to <100	2																																	
≥ 100 to <1,000	3																																	
≥ 1,000 to <10,000	6																																	
≥ 10,000 to <1E+05	10																																	
≥ 1E+05 to <1E+06	18																																	
≥ 1E+06 to <1E+07	32	✓																																
≥ 1E+07 to <1E+08	56																																	
≥ 1E+08 or greater	100																																	
WC =	32																																	

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the air migration pathway score. If the pathway score is greater than 100, assign 100.

AIR MIGRATION PATHWAY CALCULATION:

$$\frac{LE \times T \times WC}{82,500} =$$

16.07

(Maximum of 100)

Notes:

Calculations: $(500 \times 82.8595 \times 32) \div 82,500 = 16.07$

SI TABLE 22 (FROM HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS

Distance From Site	Pop.	Nearest Individual (choose highest)	NUMBER OF PEOPLE WITHIN THE DISTANCE CATEGORY												Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000	
On a source	8	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	4
0 to 1/4 mile	1,328	*	1	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114	408
> 1/4 to 1/2 mile	1,350	2	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88,153	88
> 1/2 to 1 mile	2,649	1	0.06	0.3	0.9	3	8	26	83	261	834	2,612	8,342	26,119	26
> 1 to 2 miles	5,320	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	8,326	27
> 2 to 3 miles	8,140	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	3,755	12
> 3 to 4 miles	8,632	0	0.005	0.02	0.07	0.2	0.7	2	7	28	73	229	730	2,285	7
Nearest Individual =		20	Sum =												572

*Score = 20 if the Nearest Individual is within 0.125 miles of a source; score = 7 if the Nearest Individual is between 0.125 and 0.25 miles of a source.

References:

Notes: Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which START personnel will consider potential air contamination targets for this evaluation are the eight people working for WRT on the landscape/grounds maintenance crew.

SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

*	WETLAND AREA	ASSIGNED VALUE
	< 1 acre	0
✓	1 to 50 acres	25
	> 50 to 100 acres	75
	> 100 to 150 acres	125
	> 150 to 200 acres	175
✓	> 200 to 300 acres	250
	> 300 to 400 acres	350
	> 400 to 500 acres	450
✓	> 500 acres	500

* Check (✓) highest value.

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

DISTANCE	DISTANCE WEIGHT	SENSITIVE ENVIRONMENT TYPE AND VALUE (FROM SI TABLES 13 AND 23)	PRODUCT
On a Source	0.10	×	
		×	
0 to 1/4 mile	0.025	×	0.125
		×	
		×	
1/4 to 1/2 mile	0.0054	×	0.135
		×	
		×	
1/2 to 1 mile	0.0016	×	0.04
		×	
		×	
1 to 2 miles	0.0005	×	0.125
		×	
		×	
2 to 3 miles	0.00023	×	0.115
		×	
		×	
3 to 4 miles	0.00014	×	0.07
		×	
> 4 miles	0	×	
Total Environments Score =			0.6595

Notes: (A) Particular areas, small in size, important to the maintenance of unique biotic communities. (State-Concerned Species). Value = 25/occurrence
(B) State Endangered Species: Value = 50/occurrence

SITE SCORE CALCULATION	S	S ²
GROUNDWATER PATHWAY SCORE (S _{GW})	71.04	5,046.68
SURFACE WATER PATHWAY SCORE (S _{SW})	1.979	3.92
SOIL EXPOSURE PATHWAY SCORE(S _{SE})	0.0	0.0
AIR PATHWAY SCORE (S _A)	16.07	258.25
SITE SCORE $\sqrt{\frac{S_{GW}^2 + S_{SW}^2 + S_{SE}^2 + S_A^2}{4}} =$		36.43

COMMENTS:

Notes: Numbers in parentheses are a hypothetical evaluation to illustrate the effect should the detection of vinyl chloride occur in the surficial soils of the property. If this compound were detected the Soil Exposure Pathway score would become 1.852 and the Site Score would become 36.44.

WARNING!!

EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1993 OSWER Directive 9320.1-11.